

California High-Speed Rail Authority



RFP No.: HSR 14-32

**Request for Proposals for Design-Build
Services for Construction Package 4**

**Book III, Part B.1
Directive Drawings**

CIVIL DIRECTIVE NOTES

A. GENERAL SITE NOTES

1. FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE AUTHORITY'S REPRESENTATIVE.
2. ALL CONSTRUCTION ACTIVITIES AFFECTING THIRD PARTY FACILITIES SHALL BE COORDINATED WITH THE PROPER JURISDICTION AUTHORITY.
3. FOR ABBREVIATIONS, SEE GENERAL DIRECTIVE DRAWINGS.
4. FOR SYMBOLS, SEE GENERAL DIRECTIVE DRAWINGS.
5. "ORIGINAL GROUND" SHOWN ON CROSS SECTIONS REFERS TO THE APPROXIMATE EXISTING GROUND LINE AT THE DESIGNATED CENTERLINE, BASELINE, LAYOUT LINE OR SECTION LINE.
6. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL CODES AND ORDINANCES IN EFFECT.
7. PROVIDE AND MAINTAIN PROPER BARRICADES, RAILINGS, GUARDS, FLAGGING, LIGHTING, OR OTHER DEVICES NECESSARY FOR THE PROTECTION OF LIFE AND PROPERTY.
8. VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING MATERIALS.

B. GRADING

1. DO NOT PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATION OCCUR THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
2. KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE.
3. PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
4. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
5. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN THE LATEST CALTRANS STORM WATER QUALITY HANDBOOKS.

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY S. MILITELLO	DRAWN BY R. MINCIO	CHECKED BY H. NGUYEN	IN CHARGE J. CHIRCO	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



CALIFORNIA HIGH-SPEED TRAIN PROJECT GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES CIVIL

CONTRACT NO.	
DRAWING NO.	DD-GE-001
SCALE	NO SCALE
SHEET NO.	

TRACK DIRECTIVE NOTES

1. THE GENERAL BASIS FOR TRACK STANDARDS AND MATERIALS SHALL BE THE AREMA MANUAL.
2. TRACK AND TRACK COMPONENTS SHALL BE DESIGNED AND FABRICATED TO PERFORM UNDER THE PREVAILING AND EXTREME CLIMATIC AND ENVIRONMENTAL CONDITIONS OCCURRING WITHIN THE GEOGRAPHIC EXTENT OF THE SYSTEM.
3. THE PROFILE GRADE LINE IS CARRIED ON THE TOP OF LOW RAIL THROUGH HORIZONTAL CURVES AND SPIRALS FOR THE DESIGNATED TRACK.
4. THE LENGTHS OF TRACK IS BASED ON CENTER OF TRACK ALIGNMENT.
5. UNLESS SEPARATE TRACK PROFILES ARE GIVEN, TRACK PARALLEL TO THE DESIGNATED TRACK ARE AT THE SAME TOP OF RAIL ELEVATIONS PROJECTED ON EITHER PERPENDICULAR OR RADIAL LINES FROM THE DESIGNATED TRACK CENTERLINES.
6. BALLASTED TRACKS ARE GENERALLY PREFERRED FOR YARD TRACKS. DESIGNERS SHALL FOLLOW THE REQUIREMENTS ASSOCIATED WITH CONSTRUCTION OF BALLASTED TRACK IN THE CALIFORNIA HIGH SPEED TRAIN DESIGN MANUAL.

DESIGNED BY S. MILITELLO			CALIFORNIA HIGH-SPEED TRAIN PROJECT GENERAL DIRECTIVE					CONTRACT NO.	
DRAWN BY R. MINCIO								DRAWING NO.	
CHECKED BY H. NGUYEN								DD-GE-002	
IN CHARGE J. CHIRCO								SCALE	
DATE 01/24/2014								NO SCALE	
REV	DATE	BY	CHK	APP	DESCRIPTION				SHEET NO.

**PARSONS
BRINCKERHOFF**



GENERAL DIRECTIVE NOTES
TRACK

STRUCTURAL DIRECTIVE NOTES:

A. SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

- CONSTRUCTION SPECIFICATION SHALL BE THE DESIGN-BUILD STANDARD SPECIFICATION, CALIFORNIA HIGH SPEED TRAIN.
- THE STRUCTURAL DESIGN OF STRUCTURES SUPPORTING HIGH SPEED TRAINS SHALL BE BASED ON THE REQUIREMENTS OF THE CALIFORNIA HIGH SPEED RAIL AUTHORITY.
- DESIGN CRITERIA FOR HIGHWAY BRIDGES SHALL BE THE CALIFORNIA BRIDGE DESIGN SPECIFICATION. FOR HIGHWAY BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.
- DESIGN CRITERIA FOR RAILROAD STRUCTURES NOT SUPPORTING HIGH SPEED TRAINS SHALL BE THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING (APRIL 2008). FOR RAILROAD BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.

B. DESIGN METHOD

- DESIGN SHALL BE PERFORMED TO THE LOAD AND RESISTANCE FACTOR (LRFD) DESIGN METHOD.
- THE DESIGN OF PRESTRESSING AND PARTIAL PRESTRESSING SHALL CONFORM TO THE REQUIREMENTS OF SUBSECTION 5.9 OF AASHTO LRFD WITH CALIFORNIA AMENDMENTS WITH THE FOLLOWING EXCEPTION: NET TENSION STRESSES ARE NOT ALLOWED IN THE PRECOMPRESSED TENSILE ZONE AFTER ALL LOSSES HAVE OCCURRED.

C. GENERAL

- SEE GENERAL DIRECTIVE DRAWINGS FOR ACRONYMS AND ABBREVIATIONS.
- ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER DRAWINGS RELATED TO THE WORK.
- EMBEDDED ITEMS SUCH AS PIPES, INSERTS, SLEEVES AND CONDUITS, AND ANY RECESSES, NICHES OR OPENINGS REQUIRED FOR UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL INSTALLATIONS ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL REFER TO THE UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE LOCATIONS AND DETAILS OF THESE ITEMS. CONTRACTOR SHALL REVIEW AND APPROVE ALL PENETRATIONS PRIOR TO CONSTRUCTION. PENETRATIONS WHICH LOCAL THICKENING OF CONCRETE OR STEEL MEMBERS AND /OR SUPPLEMENTAL REINFORCING SHALL BE SHOWN ON THE STRUCTURAL DRAWINGS.
- THE VERTICAL CONTROL OF ALL TRACK STRUCTURES IS BASED ON THE TOP OF LOW RAIL ELEVATION IN SUPERELEVATED STRUCTURES.

5. CONTRACTORS ATTENTION IS DIRECTED TO THE AREAS OF SAG VERTICAL CURVES. IN SUCH AREAS CAUTION SHOULD BE EXERCISED THAT THE DIMENSION TO THE INVERT OF CONCRETE OF GUIDEWAY IS NEVER LESS THAN THAT SHOWN FOR INVERT DETAILS.

6. ALL CONSTRUCTION JOINTS IN EARTH RETAINING STRUCTURES AND IN STRUCTURES BELOW THE FINISH GRADE SHALL CONTAIN CONTINUOUS WATERSTOPs, AND SHALL HAVE REINFORCEMENT CONTINUOUS ACROSS ALL JOINTS. HYDROSWELLING STRIPS SHALL BE INSTALLED ON ALL JOINT SURFACES WHICH WILL BE EXPOSED TO EARTH AND PERMANENTLY UNDER THE GROUNDWATER ELEVATION.

7. ALL WATERSTOPs SHALL BE INSTALLED SECURELY IN ACCORDANCE WITH THE SPECIFICATIONS. THE WATERSTOPs SHALL BE PLACED CONTINUOUSLY THROUGHOUT THE LENGTH OF THE CONSTRUCTION JOINT. LAPPING OF WATERSTOPs SHALL NOT BE PERMITTED. SPlicing SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

8. UNLESS INDICATED OTHERWISE, CONCRETE SURFACES LEADING TO DRAINS SHALL BE SLOPED A MINIMUM OF $\frac{1}{8}$ INCH PER FOOT TOWARD THE DRAIN AND THE ADJACENT SURFACES warped AS REQUIRED TO SATISFY AN ADEQUATE DRAINAGE FLOW.

9. CAST-IN-PLACE CONCRETE DECKS ON PRECAST CONCRETE GIRDERS OR STEEL GIRDERS OF PRIMARY TYPE 1, PRIMARY TYPE 2 AND SECONDARY STRUCTURES SHALL HAVE A SHRINKAGE VALUE OF 0.025 PERCENT OR LESS WHEN MEASURED AT 28 DAYS AND OF 0.035 PERCENT OR LESS WHEN MEASURED AT 180 DAYS IN ACCORDANCE WITH ASTM C157, STANDARD TEST METHOD FOR LENGTH CHANGE OR HARDENED HYDRAULIC-CEMENT MORTAR AND CONCRETE. CRACK CONTROL OF THESE DECKS MAY BE ACHIEVED THROUGH USE OF MATERIALS SUCH AS SHRINKAGE REDUCING ADMIXTURE (SRA), SYNTHETIC FIBER REINFORCEMENT AND WATER-REDUCING ADMIXTURE.

D. MATERIAL PROPERTIES

1. CONCRETE 28 DAY COMPRESSIVE STRENGTH (MINIMUM)

- DRILLED SHAFTS: $f'_c=4,000$ PSI
- PRECAST-PRESTRESSED PILES: $f'_c=6,000$ PSI
- FORMED CAST-IN-PLACE STRUCTURAL CONCRETE:
 f'_c (UNDER GROUND)=4000 PSI
 f'_c (ABOVE GROUND)=5000 PSI
- PRECAST GIRDERS OR SEGMENTS OF GIRDERS:
 $f'_c=6,000$ PSI
- UNLESS NOTED OTHERWISE ON THE DRAWINGS, OR SPECIFIED, MINIMUM STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
- ALL EXPOSED CONCRETE EDGES AND CORNERS SHALL BE CHAMFERED WITH A $\frac{3}{4}$ INCH, 45 DEGREE CHAMFER UNLESS NOTED OTHERWISE.

2. REINFORCING STEEL SHALL CONFORM TO THE SPECIFICATIONS OF ASTM A 706 GRADE 60.

3. PRESTRESSING STEEL

a) STRAND: ASTM A416/AASHTO M203, GRADE 270, LOW RELAXATION FRICTION COEFFICIENT: 0.25 WOBBLE COEFFICIENT: 0.0002 PER FT ANCHOR SET: 0.375" APPARENT MODULUS: 28,500 KSI MINIMUM JACKING STRESS: 216 KSI (80% ULTIMATE) MAXIMUM ANCHORING STRESS: 189 KSI (70% ULTIMATE) MAXIMUM STRESS AFTER ANCHOR SET: 202 KSI (75% ULTIMATE) STRAND DIAMETER: 0.6" (AREA=0.216 SQ IN)

b) POST TENSIONING BARS:
ASTM A722/AASHTO M275, GRADE 150, TYPE II ANCHOR SET: 0.0625" APPARENT MODULUS: 30,000 KSI MAXIMUM JACKING STRESS: 113 KSI MAXIMUM ANCHORING STRESS: 105 KSI MAXIMUM STRESS AFTER LOSSES: 96 KSI

4. STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A6 WITH A YIELD STRENGTH OF $F_y = 50$ KSI UNLESS NOTED OTHERWISE. THE FOLLOWING MATERIAL PROPERTIES SHALL APPLY:

- WIDE FLANGE SHAPES: ASTM A992
- M-SHAPES, S-SHAPES, HP SHAPES: ASTM A572
- ANGLES, CHANNELS: ASTM A572
- RECTANGULAR AND SQUARE HSS: ASTM A500 GR B (46 KSI)
- ROUND HSS: ASTM A500 GR B (42 KSI)
- STEEL PIPE: ASTM A53 GR B (35 KSI)
- PLATES, BARS: ASTM A36 (36 KSI)
- BOLTS: ASTM A325
- NUTS: ASTM A563
- WASHERS: ASTM F436

5. STEEL FABRICATIONS

- WELDING OF BUILT UP MEMBERS AND STEEL FABRICATIONS SHALL COMPLY WITH AASHTO/AWS D 1.5
- WELDING OF HSS SECTIONS AND PIPES SHALL COMPLY WITH AWS D 1.1
- MISCELLANEOUS STEEL ITEMS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION UNLESS COMPLETELY EMBEDDED IN CONCRETE AND UNLESS NOTED OTHERWISE.

6. FASTENERS

- ALL HIGH STRENGTH BOLTS NUTS AND WASHERS SHALL BE ZINC COATED
- ALL BOLTED CONNECTIONS SHALL COMPLY WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".
- ALL BOLTS ARE ASTM A325 HIGH STRENGTH SLIP CRITICAL WITH THREADS EXCLUDED FROM THE SHEAR PLANE

E. CONCRETE COVER

1. UNLESS OTHERWISE NOTED, MINIMUM CONCRETE COVER SHALL CONFORM TO AASHTO LRFD WITH CALTRANS AMENDMENTS TABLE 5.12.3-1 WITH THE FOLLOWING EXCEPTIONS:

- UNCASED DRILLED SHAFTS: 6 INCHES
- CASED DRILLED SHAFTS WITH TEMPORARY CASING: 4 INCHES

F. SEISMIC LOADING AND DESIGN

1. THERE ARE TWO LEVELS OF DESIGN EARTHQUAKES:

a) MAXIMUM CONSIDERED EARTHQUAKE (MCE): GROUND MOTIONS CORRESPONDING TO GREATER OF (1) A PROBABILISTIC SPECTRUM BASED UPON A 10% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 950 YEARS) AND (2) A DETERMINISTIC SPECTRUM BASED UPON THE LARGEST MEDIAN RESPONSE RESULTING FROM THE MAXIMUM RUPTURE (CORRESPONDING TO M) OF ANY FAULT IN THE VICINITY OF THE STRUCTURE.

b) OPERATING BASIS EARTHQUAKE (OBE): GROUND MOTIONS CORRESPONDING TO A PROBABILISTIC SPECTRUM BASED UPON AN 86% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 50 YEARS).

REV	DATE	BY	CHK	APP	DESCRIPTION	04/17/2015
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DESIGNED BY
P. LIN
DRAWN BY
R. MINCIO
CHECKED BY
T. JACKSON
IN CHARGE
J. CHIRCO
DATE

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CALIFORNIA HIGH-SPEED TRAIN PROJECT

GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES STRUCTURAL

CONTRACT NO.	
DRAWING NO.	DD-GE-003
SCALE	NO SCALE
SHEET NO.	

A		B CONTINUED		C CONTINUED		D	
@	AT	BCR	BEGIN CURB RETURN	CEM	CEMENT	D	DEPTH
A&G	ARCHITECTURAL AND ENGINEERING	BD	BOARD	CER	COMMUNICATIONS EQUIPMENT ROOM	DB	DESIGN-BUILD
A/G	AT-GRADE	BDA	BI-DIRECTIONAL AMPLIFIER	C&G	CURB & GUTTER	DBE	DESIGN BASIS EARTHQUAKE
AADT	AVERAGE ANNUAL DAILY TRAFFIC	BDD	BRIDGE DESIGN DETAILS (CALTRANS)	CG	CENTER OF GRAVITY	DBL	DOUBLE
AB	AGGREGATE BASE,	BDP	BRIDGE DESIGN PRACTICE (CALTRANS)	CGS	CALIFORNIA GEOLOGICAL SURVEY	DC	DIRECT CURRENT
ABBC	ANCHOR BOLT	BDS	BRIDGE DESIGN SPECIFICATIONS (CALTRANS)	CHNL	CHANNEL	DCMB	Dc DISTRIBUTION PANEL MAIN BREAKER
ABM	ASBESTOS BONDED BITUMINOUS COATED	BEC	BURIED EARTH (GROUND) CONDUCTOR	CI	CAST IRON	DCP	Dc DISTRIBUTION PANEL
ABN	AIR-BLOWN MORTAR	BEG	BEGIN	CIC	COMMUNICATIONS INTERFACE CABINET	DD	DOWNDRAIN,
ABUT	ABANDON	BFA	BY PASS FEEDER ANCHOR	CIDH	CAST-IN-DRILLED-HOLE	DE	DEVICE DRIVER
ABV	ABUTMENT	BIL	BASIC IMPULSE INSULATION LEVEL	CIF	COMMON INTERMEDIATE FORMAT	DEL	DEAD END
AC	ABOVE	BITUM	BITUMINOUS	C-I-P	CAST IRON PIPE	DEMO	DELINEATOR
ACB	ALTERNATING CURRENT,	BK	BACK	CIPCP	CAST-IN-PLACE	DEPT	DEMOLISH
ACMB	ASPHALT CONCRETE	BKF	BACKFILL	CIS	CAST-IN-PLACE CONCRETE PIPE	DET	DETOUR
ACOUS	AC DISTRIBUTION PANEL MAIN BREAKER	BKR	BREAKER	CJ	CUSTOMER INFORMATION SIGN	DF	DIRECT FIXATION,
ACP	ACOUSTICAL	BL	BASE LINE	CJP	CAST-IN-STEEL-SHELL	DGA	DRINKING FOUNTAIN
ACS	ASBESTOS CEMENT PIPE	BLDG	BUILDING	CKT	CONSTRUCTION JOINT	DHV	DOWN GUY ANCHOR
ACSR	ACCESS CONTROL ROOM	BLKG	BLOCKING	CL	COMPLETE JOINT PENETRATION	DI	DESIGN HOURLY VOLUME
AD	ALUMINUM CONDUCTOR STEEL REINFORCED	BLST	BRIDGE-LOG MILE	CL2	CLASS	DIAG	DRAINAGE INLET
ADJ	AREA DRAIN,	BLVD	BALLAST	CL-6	CLASS 2	DIAPH	DIAGONAL
ADJ	ACCESS DETERRING	BM	BOULEVARD	CLG	CHAIN LINK FENCE (6 FT)	DIFF	DIAPHRAGM
ADL	ADJACENT,	BND	BENCH MARK	CLK	CEILING	DIM	DIFFERENTIAL
ADP	ADJUST,	BOC	BACKBONE NETWORK	CLKG	CHAIN LINK	DISTR	DIMENSION
ADT	ADJUSTABLE	BOCC	BOTTOM OF CURB	CLO	CAULKING	DMBB	DISTRIBUTION
AEC	ADDED DEAD LOAD	BOS	BACK-UP OPERATIONAL CONTROL CENTER	CLR	CLOSESET	DN	DOUBLE METAL BEAM BARRIER
AED	AC DISTRIBUTION PANEL	BOT	BOTTOM OF SLOPE	CM	CLEAR,	DIR	DIRECTION
AEC	AVERAGE DAILY TRAFFIC	BOW	BOTTOM	CM	CLEARANCE	DISC	DISCONNECT
AED	AERIAL EARTH (GROUND) CONDUCTOR	BR	BOTTOM OF WALL	CMP	CONTROL MODULE,	DIST	DISPENSER
AFC	AUTOMATED EXTERNAL DEFIBRILLATOR	BRG	BRIDGE	CMU	CORRUGATED METAL	DISTR	DISTANCE
AFES	AUTOMATIC FARE COLLECTION	BRKT	BEARING	CNTR	CORRUGATED METAL PIPE	DMBB	DISTRIBUTION
AGW	ALTERNATIVE FLARED END SECTION	BRS	BRACKET	CO	CONCRETE MASONRY UNIT	DN	DOUBLE METAL BEAM BARRIER
AHD	AERIAL GROUND WIRE	BRT	BROADBAND RADIO SYSTEM	COL	COLUMN	DIR	DOWN
AL	AHEAD	BS	BUS RAPID TRANSIT	COMM	COMMUNICATIONS	DSC	DOMAIN NAME SYSTEM
ALIGN	ALUMINUM	BSC	BODY SPAN WIRE	COND	CONCRETE	DSCW	DOOR OPENING
ALT	ALIGNMENT	BT	BASE STATION CONTROLLER	CONN	CONDUT	DISC	DOUBLE-POLE DOUBLE-THROW
AM	ALTERNATE	BTM	BUS TIE	CONST	CONNECTOR,	DISP	DRIVE
ANC	TIME FROM MIDNIGHT TO NOON	BTS	BOTTOM	CONT	CONNECTION	DIST	DOWNSPOUT,
ANI	ANCHOR	BTWN	BASE TRANSCEIVER STATION	CONT	CONSTRUCT,	DSTA	DISCONNECT SWITCH
ANN	AUTOMATIC NUMBER IDENTIFICATION	BW	BETWEEN	CONT	CONSTRUCTION	DTBB	DIFFERING SITE CONDITIONS
ANS	ANNUNCIATOR	BWA	BARBED WIRE,	CONST	CONTINUOUS,	DTCB	DIRECT SUSPENSION CONTACT WIRE
AP	AMBIENT NOISE SENSOR	BWL	BALANCE WEIGHT	CONT	CONTINUATION	DTS	DISCONNECT SWITCH GROUP
APC	ALTERNATIVE PIPE	BZ	BALANCE WEIGHT ANCHOR	CONTR	CONTRACTOR	DTHA	DETERMINISTIC SEISMIC HAZARD ANALYSIS
APE	ALTERNATIVE PIPE CULVERT	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	COORD	COORDINATE	DTRB	DISTRICT
APEFZ	AREA OF POTENTIAL EFFECTS	BZ	BRONZE	CORR	CORRIDOR	DTRB	DOUBLE THRE BEAM BARRIER
API	ALQUIST-PRIULO EARTHQUAKE FAULT ZONE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CPT	CONTROL POINT	DVR	DIGITAL TERRAIN MODEL
APPROX	APPLICATION PROGRAMMING INTERFACE	BZ	BRONZE	CPU	CONE PENETRATION TEST,	DWG	DIGITAL VIDEO RECORDERS
APU	APPROXIMATE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CR	CONTROL POWER TRANSFORMER	DWY	DRAWING
AR	APU	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CREEK,	CENTRAL PROCESSING UNIT	DXO	DRIVeway
ARCH	ALTERNATIVE PIPE UNDERDRAIN	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CRC	CONDUIT RISER	E	DOUBLE CROSSOVER
ARS	ACCESS RESTRICTION	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CRCP	COMBINED RELAY AND CONTROL PANEL	EAST	
AS	ARCHITECTURAL	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CRSP	CONTINUOUS REINFORCED CONCRETE PAVEMENT	EACH	
ASPH	ACCELERATION RESPONSE SPECTRUM	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CRZ	CONCRETED ROCK SLOPE PROTECTION	EASTBOUND,	
ASSP	AGGREGATE SUBBASE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CS	CLEAR RECOVERY ZONE	END OF BRIDGE	
ASSY	ASPHALT	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CSA	CONSTRUCTION STAGING AREA	END HORIZONTAL CURVE,	
AT	ALUMINUM SPIRAL RIB PIPE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CSP	CORRUGATED STEEL PIPE	ELECTRICAL CONDUCTOR	
ATC	ASSEMBLY	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CSPA	CORRUGATED STEEL PIPE ARCH	END CURB RETURN	
ATEL	AUTOTRANSFORMER,	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CT	CERAMIC TILE,	EACH END	
ATM	AUTOMATIC TENSION	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTB	COURT,	EACH FACE	
ATO	ADMINISTRATIVE TELEPHONE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTPB	CURRENT TRANSFORMER/TRANSDUCER	EMERGENCY GROUND SWITCH	
ATP	ALONG TRACK MOVEMENT	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTPM	CEMENT TREATED BASE	EXTRA HIGH STRENGTH	
ATPB	AUTOMATIC TRAIN OPERATION	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTR	CEMENT TREATED PERMEABLE BASE	EMERGENCY INTERCOM	
ATPM	AUTOMATIC TRAIN PROTECTION	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTSK	CEMENT TREATED PERMEABLE MATERIAL	EXPANSION JOINT	
ATR	ASPHALT TREATED PERMEABLE BASE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTTV	CENTER	E-LAN	
ATS	ASPHALT TREATED PERMEABLE MATERIAL	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CTW	COUNTERSUNK	ELASTOMERIC	
AUX	ABOVE TOP OF RAIL	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CU	COMBINED CURRENT TRANSFORMER AND	ELECTRICAL,	
AVE	AUTOMATIC TRAIN SUPERVISION,	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CULV	VOLTAGE TRANSFORMER	ELECTRIC	
AVG	AUTOTENSIONED SYSTEM	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CV	COUNTERWEIGHT TAIL WIRE	ELECTROLIER	
AVL	AUXILIARY	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CVR	COPPER	ELEVATION	
AWG	AVENUE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CW	CULVERT	ELECTRONIC LOCK	
	AVERAGE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CWA	CURVE	EMBANKMENT	
	AUTOMATIC VEHICLE LOCATION	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CWH	COVER	EMC	
	AMERICAN WIRE GAUGE	BZ	BROADBAND WIRELESS LOCAL AREA NETWORK	CWR	CONTACT WIRE	EMERGENCY	
		B	CANTENARY FOUNDATION	CWT	CONTACT WIRE ANCHOR	ELECTROMAGNETIC FIELD	
	B/SPAN	CBTC	CATENARY POLE		CONTACT WIRE HEIGHT	ELECTRO MAGNETIC INTERFERENCE	
	B/W	CBW	CATCH BASIN,		CONTINUOUSLY WELDED RAIL	ELEMENT MANAGEMENT SYSTEM	
	BAGR	C-C	CIRCUIT BREAKER		COUNTER WEIGHT	ELECTRIC MULTIPLE UNIT	
	BAR	CCO	CONCRETE BARRIER			ENCLOSURE	
	BARRIER	CCS	COMMUNICATIONS BASED TRAIN CONTROL			ENGINEER,	
	BATT	CCTV	CONCRETE BLOCK WALL			ENGINEERING	
	BATTERY	CCVT	CENTER LINE TO CENTER LINE			END OF BRIDGE	
	BB	CEG	CONTRACT CHANGE ORDER				
	B-B		CALIFORNIA COORDINATE SYSTEM				
	BC		CLOSED CIRCUIT TELEVISION				
			COUPLING CAPACITOR VOLTAGE TRANSFORMER				
			CERTIFIED ENGINEERING GEOLOGIST				
B		C		C		E	
B/SPAN	BODY SPAN	CA	CLOSE,	CRC	COMBINED RELAY AND CONTROL PANEL	EAST	
B/W	BLACK & WHITE	CAA	CONTACT,	CRCP	CONTINUOUS REINFORCED CONCRETE PAVEMENT	EACH	
BAGR	BRIDGE APPROACH GUARD RAILING	CAB	CONTROL	CRSP	CONCRETED ROCK SLOPE PROTECTION	EASTBOUND,	
BAR	BARRIER	CADD	CONTROLLED DESIGN AND DRAFTING	CRZ	CLEAR RECOVERY ZONE	END OF BRIDGE	
BAT	BATTERY	CAH	CONTROLLED ACCESS HIGHWAY	CSA	CONSTRUCTION STAGING AREA	END HORIZONTAL CURVE,	
BB	BEGINNING OF BRIDGE	CAI	CUSTOMER ASSISTANCE INTERCOM	CSP	CORRUGATED STEEL PIPE	ELECTRICAL CONDUCTOR	
B-B	BACK-TO-BACK	CALP	CORRUGATED ALUMINUM PIPE	CSPA	CORRUGATED STEEL PIPE ARCH	END CURB RETURN	
BC	BOLT CIRCLE	CANT	CANTILEVER	CT	CERAMIC TILE,	EACH END	
		CAP	CAPACITY,	CTB	COURT,	EACH FACE	
		CAPA	CAPACITOR,	CTPB	CURRENT TRANSFORMER/TRANSDUCER	EMERGENCY GROUND SWITCH	
		CAS	CORRUGATED ALUMINUM PIPE	CTPM	CEMENT TREATED BASE	EXTRA HIGH STRENGTH	
		CAT	CORRUGATED ALUMINUM PIPE ARCH	CTR	CEMENT TREATED PERMEABLE BASE	EMERGENCY INTERCOM	
		CATF	CONSTRUCTION AREA SIGN	CTSK	CEMENT TREATED PERMEABLE MATERIAL	EXPANSION JOINT	
		CATP	CATEGORY,	CTTV	CENTER	Ethernet LAN	
		CB	CATEGORY SPECIFICATION FOR	CTV	COUNTERSUNK	ELASTOMERIC	
			TWISTED PAIR CABLING,	CTV	COMBINED CURRENT TRANSFORMER AND	ELECTRICAL,	
			CATENARY	CTW	VOLTAGE TRANSFORMER	ELECTRIC	
			CANTENARY FOUNDATION	CU	COUNTERWEIGHT TAIL WIRE	ELECTROLIER	
			CATENARY POLE	CULV	COPPER	ELEVATION	
			CATCH BASIN,	CV	CULVERT	ELECTRONIC LOCK	
			CIRCUIT BREAKER	CVR	CURVE	EMBANKMENT	
			CONCRETE BARRIER	CW	COVER	EMC	
			COMMUNICATIONS BASED TRAIN CONTROL	CWA	CONTACT WIRE	EMERGENCY	
			CONCRETE BLOCK WALL	CWH	CONTACT WIRE ANCHOR	ELECTROMAGNETIC FIELD	
			CENTER LINE TO CENTER LINE	CWR	CONTACT WIRE HEIGHT	ELECTRO MAGNETIC INTERFERENCE	
			CONTRACT CHANGE ORDER	CWT	CONTINUOUSLY WELDED RAIL	ELEMENT MANAGEMENT SYSTEM	
			CALIFORNIA COORDINATE SYSTEM		COUNTER WEIGHT	ELECTRIC MULTIPLE UNIT	
			CLOSED CIRCUIT TELEVISION			ENCLOSURE	
			COUPLING CAPACITOR VOLTAGE TRANSFORMER			ENGINEER,	
		</					

E CONTINUED

EOD	EDGE OF DECK
EOS	ELECTRICAL OPERATED SWITCH
EOW	END OF WALL
EP	EDGE OF PAVEMENT
EPBM	EARTH PRESSURE BALANCING MACHINE
EPR	ETHYLENE PROPYLENE RUBBER
EQ	EQUAL,
EON	EQUILATERAL
EQUIP	EQUATION
ES	EQUIPMENT
ESA	EDGE OF SHOULDER,
ESC	EXTRA STRENGTH,
ESEW	ELECTRICAL SECTION
ESMT	ENVIRONMENTALLY SENSITIVE AREA
ETCS	EMERGENCY SHOWER / EYE WASH
ETEL	EASEMENT
ETS	EMERGENCY TRAIN CONTROL SYSTEM
ETW	EMERGENCY TELEPHONE
EW	EMERGENCY TRIP SYSTEM
EW	EDGE OF TRAVELED WAY
EXC	EACH WAY,
EXIST	ENDWALL
EXP	EXCAVATION
EXPO	EXISTING
EXWY	EXPANSION
EXT	EXPANDED
	EXPRESSED
	EXPRESSWAY
	EXTERIOR

F

F/F	FACE TO FACE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FAS	FIRE ALARM SYSTEM
FB	FLAT BAR,
FBO	FLOOR BEAM,
FC	FEEDER BREAKER
FD	FURNISHED BY OTHERS
FDC	FARE COLLECTION
FDN	FLOOR DRAIN
FDP	FIRE DEPARTMENT CONNECTION
FDR	FOUNDATION
FDU	FIBER DISTRIBUTION PANEL
FE	FEEDER
FES	FIBER DISTRIBUTION UNIT
FF	FIRE EXTINGUISHER
FFJ	FLARED END SECTION
FFL	FILTER FABRIC
FG	FULL FEEDING JUMPER
FH	FINISHED FLOOR LEVEL
FHC	FINISHED GRADE
FID	FIRE HYDRANT
FID	FIRE HOSE CABINET
FIG	FIRE INITIATING DEVICE
FIN	FIGURE
FIRM	FINISH
FJ	FLOOD INSURANCE RATE MAPS
FL	FEEDER JUMPER
FLB	FLOW LINE
FLH	FLOOR BEAM
FLR	FLAT HEAD
FNA	FLOOR
FNA	FIRE NOTIFICATION APPLIANCE
FO	FIBER OPTIC
FOC	FIBER OPTIC CABLE,
FOCN	FACE OF CURB
FOF	FACE OF CURBING NETWORK
FOP	FACE OF FINISH
FOP	FACE OF POLE
FOS	FACE OF STUDS,
FP	FACTOR OF SAFETY
FPLM	FULL PENETRATION
FPRF	FULL SPAN PRECAST LAUNCHING
FPS	FIREPROOF
FR	FRAMES PER SECOND
FREQ	FRAME
FS	FREQUENCY
	FINISHED SURFACE

FTEL	FIRE TELEPHONE
FTG	FOOTING
FTP	FILE TRANSFER PROTOCOL
FTW	FIXED END TAIL WIRE
FUT	FUTURE
FW	FEEDER WIRE
FWY	FREeway

G

G1	ENTRANCE GRADE
G2	EXIT GRADE
G/L	GROUND LINE
GALV	GALVANIZED
GCL	GRADING CONTROL LINE
GD	GRADE
GHS	GALVANIZED HIGH STRENGTH
GICE	GIGABIT ETHERNET
GIS	GAS INSULATED SWITCH,
	GEOGRAPHIC INFORMATION SYSTEM
GL	GLASS
GMA	GROUND MOTION ANALYSIS
GND	GROUND
GO-95	PUC GENERAL ORDER 95
GP	GRADING PLANE
GPS	GLOBAL POSITIONING SYSTEM
GR	GUARDRAIL,
GRP	GROUND ROD
GRS	GLASS REINFORCED PLASTIC ROD
GRX	GALVANIZED RIGID STEEL
GSHA	GRADE CROSSING
	GEOLOGIC AND SEISMIC HAZARDS
	ANALYSIS
GSP	GALVANIZED STEEL PIPE
GT	GENERAL INFORMATION
GTGM	GEOTECHNICAL TECHNICAL GUIDANCE
GTR	MANUAL (FHWA)
GW	GUTTER
GYP	GUY WIRE
GYPBD	GYPSUM
	GYPSUM BOARD

H

H/SPAN	HEADSPAN
HAZ	HAZARDOUS
HB	HARDNESS BRINELL,
HD	HOSE BIBB
HC	HANDICAP
HD	HARD DRAWN,
HDG	HORIZONTAL DRAIN
HDPE	HOT DIP GALVANIZED
HDWE	HIGH DENSITY POLYETHYLENE
HDWL	HARDWARE
HEX	HEADWALL
HH	HEXAGONAL
HI	HANDHOLE,
HI-RAIL	HEAD HARDENED
HM	HIGH
HMA	HIGHWAY TO RAILROAD VEHICLE
HMI	HOLLOW METAL
HO	HOT MIXED ASPHALT
HOR	HUMAN MACHINE INTERFACE
HOV	HAND OPERATED
HP	HORIZONTAL
	HIGH-OCCUPANCY VEHICLE
	HIGH POINT,
	HINGE POINT
HP&R	HIGHWAY PLANTING AND RESTORATION
HPS	HIGH PERFORMANCE STEEL
HR	HANDRAIL
HRL	HIGH RAIL LEVEL
HS	HIGH STRENGTH
HSR	HIGH-SPEED RAIL
HST	HIGH-SPEED TRAIN
HT	HIGH TEMPERATURE
HTR	HEATER
HV	HIGH VOLTAGE

F CONTINUED

H CONTINUED

HVAC	HEATING VENTILATION AND AIR CONDITIONING
HW	HIGH WATER
HWM	HIGH WATER MARK
HWY	HIGHWAY

M	MEDIUM LOADING
MAINT	MAINTENANCE
MAT	MATERIAL
MAX	MAXIMUM
MB	METAL BEAM
MBB	METAL BEAM BARRIER
MBGR	METAL BEAM GUARD RAILING
MCC	MAINTENANCE CONTROL CENTER
MCR	MASTER CONTROL ROOM
MDS	MOBILE DATA SYSTEM
MECH	MECHANICAL

MEDIAN	MEDIAN
MEMBRANE	MEMBRANE
MESSAGER WIRE	MESSAGER WIRE
METAL	METAL
MANUFACTURER	MANUFACTURER
MANHOLE	MANHOLE
MEAN HIGHEST HIGH WATER	MEAN HIGHEST HIGH WATER
MILD IRON	MILD IRON
MINIMUM	MINIMUM
MISCELLANEOUS	MISCELLANEOUS
MARKER	MARKER
MAIN LINE	MAIN LINE
MEAN LOWER LOW WATER	MEAN LOWER LOW WATER
MAINTENANCE MANAGEMENT INFORMATION SYSTEM	MAINTENANCE MANAGEMENT INFORMATION SYSTEM

I/O	INPUT/OUTPUT
IB	IMPEDANCE BOND
IBC	INTERNATIONAL BUILDING CODE
IDS	INTRUSION DETECTION CODE
IIMP	INTEGRATED INFORMATION MANAGEMENT PLATFORM
IJ	INSULATED JOINT
IJP	INSULATED JOINT PLUG
INSR	INSULATOR
INST	INSTANTANEOUS
INSUL	INSULATION
INT	INTERIOR
Inter-LATA	INTER-LOCAL ACCESS AND TRANSPORT
INV	INVERT
IR	IN-RUNNING (RIDING CONTACT WIRE)
IRR	IRRIGATION
I/S	IN-SPAN
I/SJ	IN-SPAN JUMPER

J	JUMPER
JAN	JANITOR
JB	JUNCTION BOX
JCT	JUNCTION
JP	JOINT POLE
JT(S)	JOINT(S)

LA	LANDSCAPE ARCHITECT,
LAM	LIGHTNING ARRESTER
LAN	LAMINATE
LAT	LOCAL AREA NETWORK
LAV	LATITUDE
LC	LAWNSCAPE CONTRACTOR
LCB	LEAN CONCRETE BASE
LCX	LOWER-LEVEL DESIGN BASIS EARTHQUAKE
LDBE	LEAKY COAXIAL RADIO CABLE
LED	LIGHT EMITTING DIODE
LF	LINEAR FEET
LG	LONG
LGT	LIGHT,
LH	LIGHTING
LKR	LEFT-HAND
LL	LOCKER
LLT	LIGHT LOADING
LN	LAST LONG TIE
LO	LANE
LOC	LOCKOUT
LONG	LOCATION
LONGITUDE,	LAYOUT LINE
LONGITUDINAL	LONGITUDE,
LOS	LEVEL OF SERVICE
LOTB	LOGS OF TEST BORINGS
LP	LOW POINT,
LPL	LOW PROFILE
LR	LIGHT POLE
LRT	LOW RAIL
LRV	LOAD AND RESISTANCE FACTOR DESIGN
LS	LIGHT RAIL TRANSIT
LT	LIGHT RAIL VEHICLE
LVL	LANDSCAPING,
LVT	LUMP SUM
LWP	LEVEL
	LOW VOLTAGE
	LEVEL
	LOW VIBRATION TRACK
	LOWER WORKING POINT

N	NORTH
N/A	NOT APPLICABLE
NAVD	NORTH AMERICAN VERTICAL DATUM
NORTHBOUND	NORTHBOUND</

O	
O&M	OPERATIONS AND MAINTENANCE
OA	OVERALL
OBLR	OBLITERATE
OC	ON CENTER,
	OVERCROSSING
OCC	OPERATIONS CONTROL CENTER
OCS	OVERHEAD CONTACT SYSTEM
OF	OUTSIDE FACE
OFF	OFFSET
OG	ORIGINAL GROUND
OH	OVERHEAD
O-O	OUT TO OUT
OOR	OUT-OF-RUNNING (NONRIDING CONTACT WIRE)
OP	OVERPASS
OPL	OPERABILITY PERFORMANCE LEVEL
OPNG	OPENING
OPP	OPPOSITE
ORS	OPERATIONS RADIO SYSTEM
OSP	OUTSIDE PLANT
OVERTEMP	OVERTEMPERATURE

P TD/R	PAPER TOWEL DISPENSER & RECEPTACLE
PTEL	PASSENGER ASSISTANCE TELEPHONE
PTM	PARKING TICKET MACHINE
PTT	PUSH TO TALK
PTZ	PAN-TILT-ZOOM
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER

QOS	QUALITY OF SERVICE
QT	QUARRY TILE
QTY	QUANTITY

R	RADIUS, RED
R/A	ROCK ANCHOR
R/W, ROW	RIGHT OF WAY
R&D	REMOVE AND DISPOSE
R&S	REMOVE AND SALVAGE
RAID	REMOTE ANNUNCIATOR
RA	REDUNDANT ARRAY OF INDEPENDENT DISKS
RB	RESILIENT BASE
RBM	RAILBOUND MANGANESE FROG
RC	REGIONAL CONSULTANT,
RCA	REINFORCED CONCRETE
RCB	REINFORCED CONCRETE ARCH
RCC	REINFORCED CONCRETE BOX
RCE	REGIONAL CONTROL CENTER
RCP	REGISTERED CIVIL ENGINEER
RCPA	REINFORCED CONCRETE PIPE
RD	REINFORCED CONCRETE PIPE ARCH
RDWY	ROAD,
RE	ROADWAY
REBAR	RUNNING EDGE OF RAIL
RECT	CONCRETE REINFORCING BAR
REF	RECTANGULAR
REFP	REFERENCE
REINF	REFERENCE POINT
REL	REINFORCED,
REM	REINFORCEMENT,
REPL	REINFORCING
REOD	RELOCATE,
RESIL	RELOCATED
RET	REMOTE
REV	REPLACEMENT
REV	REQUIRED
RESIL	RESILIENT
RET	RETAINING
REV	REVISED,
RF	REVISION
RFI	RADIO FREQUENCY
RGS	REQUEST FOR INFORMATION
RH	RIGID GALVANIZED STEEL
RH	RIGHT-HAND
R-M	ROAD-MIXED
RM	RESTRICTED MANUAL,
RO	ROOM
RO	ROUGH OPENING
RP	RADIUS POINT
RR	RAILROAD,
RR	RUNNING RAIL
RRR	RESURFACING, RESTORATION, REHABILITATION (3R)
RRRR	RESURFACING, RESTORATION, REHABILITATION,
RRX	RECONSTRUCTION (4R)
RSP	RAILROAD GRADE CROSSING
RT	ROCK SLOPE PROTECTION
RT	RESILIENT TILE,
ROUTE	RIGHT
RTE	ROUTE
RTU	REMOTE TERMINAL UNIT
RW	RETAINING WALL
RWL	RAIN WATER LEADER
RWY	RAILWAY

DESIGNED BY R. MINCIO	
DRAWN BY V. HUANTE	
CHECKED BY S. MILITELLO	
IN CHARGE J. CHIRCO	
DATE 01/24/2014	

DESCRIPTION

(P) CONTINUED

PAPER TOWEL DISPENSER & RECEPTACLE	S
PASSENGER ASSISTANCE TELEPHONE	SAE
PARKING TICKET MACHINE	SALV
PUSH TO TALK	SAPP
PAN-TILT-ZOOM	SB
PUBLIC UTILITY EASEMENT	SC
POLYVINYL CHLORIDE	SCADA
PAVEMENT	SCAT
POWER	SCB

Q

QUALITY OF SERVICE
QUARRY TILE
QUANTITY

R

RADIUS, RED	S
ROCK ANCHOR	SOUTH,
RIGHT OF WAY	SLOPE
REMOVE AND DISPOSE	STRUCTURE APPROACH EMBANKMENT
REMOVE AND SALVAGE	SALVAGE
REMOTE ANNUNCIATOR	STRUCTURAL ALUMINUM PLATE PIPE
REDUNDANT ARRAY OF INDEPENDENT DISKS	SOUTHBOUND
RESILIENT BASE	SWITCH CABLE
RAILBOUND MANGANESE FROG	SUPERVISORY CONTROL AND DATA
REGIONAL CONSULTANT,	ACQUISITION
REINFORCED CONCRETE	SIMPLE CATENARY-AUTO TENSION
REINFORCED CONCRETE ARCH	SUBSTATION CONTROL BUILDING
REINFORCED CONCRETE BOX	STATION CONTROL CENTER
REGIONAL CONTROL CENTER	SEAT COVER DISPENSER
REGISTERED CIVIL ENGINEER	SIMPLE CATENARY-FIXED TENSION
REINFORCED CONCRETE PIPE	SCHEDULE
REINFORCED CONCRETE PIPE ARCH	SECURITY CLASSIFICATION NUMBERS
ROAD,	SEISMIC CAPACITY AND PERFORMANCE
ROADWAY	EVALUATION
RUNNING EDGE OF RAIL	SLOTTED CORRUGATED STEEL PIPE
CONCRETE REINFORCING BAR	STORM DRAIN
RECTANGULAR	SYSTEM DUCT BANK
REFERENCE	SEISMIC DESIGN CRITERIA
REFERENCE POINT	SINGLE DEGREE OF FREEDOM
REINFORCED,	SECTIONALIZING
REINFORCEMENT,	SECTION
REINFORCING	SEPARATION
RELOCATE,	SERVICE
RELOCATED	SPRING FROG
REMOTE	SUBGRADE
REPLACEMENT	SEISMIC HAZARDS ANALYSIS
REQUIRED	SHOULDER
RESILIENT	STATE HIGHWAY SYSTEM
RETAINING	SHEET
REVISED,	SECTION INSULATOR,
REVISION	SITE INVESTIGATION
RADIO FREQUENCY	SIGNAL
REQUEST FOR INFORMATION	SIMILAR
RIGID GALVANIZED STEEL	PASSENGER STATION LOCAL AREA NETWORK
RIGHT-HAND	SELECTED MATERIAL
ROAD-MIXED	SOLID MANGANESE FROG,
RESTRICTED MANUAL,	SINGLE MODE FIBER
ROOM	SWING NOSE FROG
ROUGH OPENING	SIMPLE NETWORK TIME PROTOCOL
RADIUS POINT	SPARE
RAILROAD,	SPEC
RUNNING RAIL	SPECIFICATION
RESURFACING, RESTORATION, REHABILITATION (3R)	SPEAKER
RESURFACING, RESTORATION, REHABILITATION,	SAFETY PERFORMANCE LEVEL
RECONSTRUCTION (4R)	SMALL PART STEELWORK
RAILROAD GRADE CROSSING	SINGLE POLE SINGLE THROW
ROCK SLOPE PROTECTION	STANDARD PENETRATION TEST
RESILIENT TILE,	SQUARE
RIGHT	SYSTEM REQUIREMENT,
ROUTE	STATE ROUTE
ROUTE	SAFETY ROADSIDE REST AREA
ROUTE	SQUARE ROOT OF SUM OF SQUARES
ROUTE	STEADY SPAN
ROUTE	SLOPE STAKE,
ROUTE	SUB STATION
ROUTE	SEISMIC SAFETY COMMISSION
ROUTE	SOIL STRUCTURE INTERACTION
ROUTE	SERVICE SINK
ROUTE	STRUCTURAL STEEL PLATE ARCH
ROUTE	STRUCTURAL STEEL PLATE PIPE
ROUTE	STRUCTURAL STEEL PLATE PIPE ARCH
ROUTE	STEEL SPIRAL RIB PIPE
ROUTE	STAINLESS STEEL
ROUTE	STEADY SPAN WIRE
ROUTE	SANITARY SEWER
ROUTE	STREET
ROUTE	STATION,
ROUTE	STATIONING
ROUTE	SINGLE THRIE BEAM BARRIER
ROUTE	STANDARD
ROUTE	SINGLE TRACK CANTILEVER
ROUTE	STIFFENER
ROUTE	STL
ROUTE	STOR
ROUTE	STORAGE
ROUTE	SHIELDED TWISTED PAIR CABLE
ROUTE	STRUCTURAL,
ROUTE	STRUCTURE
ROUTE	SPIRAL TANGENT SPIRAL
ROUTE	STATIC WIRE
ROUTE	SUPERVISORY

S

SOUTH,	S
SLOPE	SUSP
STRUCTURE APPROACH EMBANKMENT	SWK
SALVAGE	SW
STRUCTURAL ALUMINUM PLATE PIPE	SWA
SOUTHBOUND	SWAT
SWITCH CABLE	SWFT
SUPERVISORY CONTROL AND DATA	SWGR
ACQUISITION	SWT
SIMPLE CATENARY-AUTO TENSION	SWPPP
SUBSTATION CONTROL BUILDING	SWR
STATION CONTROL CENTER	SWS
SEAT COVER DISPENSER	SYM
SIMPLE CATENARY-FIXED TENSION	
SCHEDULE	
SECURITY CLASSIFICATION NUMBERS	
SEISMIC CAPACITY AND PERFORMANCE	
EVALUATION	
SLOTTED CORRUGATED STEEL PIPE	
STORM DRAIN	
SYSTEM DUCT BANK	
SEISMIC DESIGN CRITERIA	
SINGLE DEGREE OF FREEDOM	
SUPERVISORY	
STRUCTURE	
STRUCTURAL,	
STRUCTURE	
SPIRAL TANGENT SPIRAL	
STATIC WIRE	
SUPERVISORY	

T

SOUTH,	T
SLOPE	T&B
STRUCTURE APPROACH EMBANKMENT	TAN
SALVAGE	TASAS
STRUCTURAL ALUMINUM PLATE PIPE	
SOUTHBOUND	
SWITCH CABLE	
SUPERVISORY CONTROL AND DATA	
ACQUISITION	
SIMPLE CATENARY-AUTO TENSION	
SUBSTATION CONTROL BUILDING	
STATION CONTROL CENTER	
SEAT COVER DISPENSER	
SIMPLE CATENARY-FIXED TENSION	
SCHEDULE	
SECURITY CLASSIFICATION NUMBERS	
SEISMIC CAPACITY AND PERFORMANCE	
EVALUATION	
SLOTTED CORRUGATED STEEL PIPE	
STORM DRAIN	
SYSTEM DUCT BANK	

TTC	TWO TRACK CANTILEVER
TTEL	TRAIN EMERGENCY SPEAKERPHONE
TV	TELEVISION
TVM(S)	TICKET VENDING MACHINE(S)
TW	TIE WIRE
TYP	TYPICAL

U

U/S	UNDERSIDE
UB	UTILITY BOX
UC	UNDERCROSSING
UD	UNDERDRAIN
UG	UNDERGROUND, UNDER GRADE
UGB	UNDERGRADE BRIDGE
UI	USER INTERFACE
UNF	UNFINISHED
UNINS	UNINSULATED
UON	UNLESS OTHERWISE NOTED
UP	UNDERPASS
UPS	UNINTERRUPTIBLE POWER SUPPLY
UR	URINAL
UREDAS	URGENT EARTHQUAKE DETECTION AND ALARM SYSTEM
USCS	UNITED SOIL CLASSIFICATION SYSTEM
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
UWP	UPPER WORKING POINT

V

V	DESIGN SPEED,
VALVE	
VAC	VOLTS ALTERNATING CURRENT
VAR	VARIABLE, VARIES,
VCAT	VOLT-AMPERE REACTIVE
VCP	VIRTUAL CONCATENATION
VCT	VITRIFIED CLAY PIPE
VDC	VINYL COMPOSITION TILE
VE	VOLT DC
VERT	VALUE ENGINEERING
VEST	VERTICAL
VIA	VESTIBULE
VLAN	VIA DUCT
VMS	VIRTUAL LOCAL AREA NETWORK
VOL	VARIABLE MESSAGE SIGN, VARIABLE MESSAGE SYSTEM,
VOIP	VOLUME
VPN	VOICE OVER INTERNET PROTOCOL
VRCS	VIRTUAL PRIVATE NETWORK
VS	VOICE RADIO COMMUNICATIONS SYSTEM
VT	VOLTAGE SWITCH
	VOLTAGE TRANSFORER/TRANSDUCER

W

W	WEST,
W/	WIDTH
W/O	WITH
WA	WITHOUT
WB	WORK AREA
WC	WESTBOUND
WCS	WATER CLOSET
WD	WIRELESS COMMUNICATIONS SYSTEM
WLAN	WOOD
WM	WIRELESS LOCAL AREA NETWORK
WP	WIRE MESH
WPF	WORK POINT,
WPC	WOOD POLE
WR	WATERPROOF
WRT	WAYSIDE POWER CUBICLES
	WIRE RUN
	WITH RESPECT TO

W CONTINUED

WS	WATER SURFACE, WORK STATION
WSP	WELDED STEEL PIPE
WT	WEIGHT
WV	WATER VALVE
WW	WINGWALL, WALKWAY
WWF	WELDED WIRE FABRIC
WWOL	WINGWALL LAYOUT LINE
WWM	WELDED WIRE MESH

X

X/CAT	CROSS CANTENARY
X/SPAN	CROSS SPAN
XD	TRANSDUCER
XFMR	TRANSFORMER
XO	Crossover
XO ST	Crossover Spring Tensioner
XSEC	Cross Section
XING	Crossing
XMITTER	Transmitter

TRACK GEOMETRY - HORIZONTAL

BC	BEGIN HORIZONTAL CURVE
CC	COMPOUND CURVE
CS	POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
K1	TANGENT DISTANCE PF SHIFT PC REFERENCE TO THE TS
K2	TANGENT DISTANCE PF SHIFT PT REFERENCE TO THE ST

Lc	LENGTH OF CIRCULAR CURVE
Ls1	LENGTH OF SPIRAL
Ls2	LENGTH OF SPIRAL FROM TS TO SC
LSc	LENGTH OF SPIRAL FROM CS TO ST
LVC	LENGTH OF COMPOUND SPIRAL FROM CS TO SC

p1	OFFSET FROM INITIAL TANGENT TO PC OF THE SHIFTED CIRCLE OF SPIRALIZED CURVE
p2	OFFSET FROM INITIAL TANGENT TO PT OF THE SHIFTED CIRCLE OF SPIRALIZED CURVE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVE
PF	POINT OF FROG
PI	POINT OF INTERSECTION
PITO	POINT OF INTERSECTION TURNOUT
POC	POINT ON HORIZONTAL CURVE
POS	POINT ON SPIRAL,
POVC	POINT ON VERTICAL CURVE
POVT	POINT ON VERTICAL TANGENT
PRC	POINT OF REVERSE CURVE
PRVC	POINT OF REVERSE VERTICAL CURVE
PS	POINT OF SWITCH
PT	POINT OF TANGENT

SC	POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE
SPO	POINT ON ORIGIN OF COMPOUND SPIRAL
SS	POINT OF CHANGE BETWEEN SPIRALS
SSC	SPIRAL TO SPIRAL POINT OF CURVATURE
ST	POINT OF CHANGE FROM SPIRAL TO TANGENT

TC	POINT OF CHANGE FROM TANGENT TO CURVE
TS	POINT OF CHANGE FROM TANGENT TO SPIRAL
TS1	TANGENT DISTANCE FROM TS TO PI
TS2	TANGENT DISTANCE FROM ST TO PI

Xs1	TANGENT OFFSET AT THE SC
Xs2	TANGENT OFFSET AT THE CS
Ys1	TANGENT DISTANCE AT THE SC
Ys2	TANGENT DISTANCE AT THE CS

Δ	TOTAL CENTRAL ANGLE OF THE SPIRALIZED CURVE
Δc	CENTRAL ANGLE OF CIRCULAR CURVE (Lc) FROM SC TO CS
Δc1	CENTRAL ANGLE OF FIRST CIRCULAR CURVE OF COMPOUND CURVATURE
Δc2	CENTRAL ANGLE OF SECOND CIRCULAR CURVE OF COMPOUND CURVATURE
θs1	CENTRAL ANGLE OF SPIRAL LENGTH Ls1 OR SPIRAL ANGLE OF FIRST SPIRAL IN SPIRALIZED CURVE

θs2	CENTRAL ANGLE OF SPIRAL LENGTH Ls2 OR SPIRAL ANGLE OF SECOND SPIRAL IN SPIRALIZED CURVE
θsc	CENTRAL ANGLE OF COMPOUND SPIRAL OR COMPOUND SPIRAL ANGLE FROM CS TO SC

sec	SECOND
sf	SQUARE FEET
sy	SQUARE YARD
tf	TRACK FEET
va	VOLTS

PCVC	POINT OF COMPOUND VERTICAL CURVE
POVC	POINT OF VERTICAL INTERSECTION
POVT	POINT ON VERTICAL CURVE
PVI	POINT ON VERTICAL TANGENT

VC	VERTICAL CURVE
VPI	VERTICAL POINT OF INTERSECTION

UNITS OF MEASUREMENT

Ac	ACRES
AMP	AMPERES

AGENCIES/ORGANIZATIONS/REFERENCE		AGENCIES/ORGANIZATIONS/REFERENCE CONTINUED		SEGMENT/COUNTY CODES AND SUBDIVISIONS	
AAR	ASSOCIATION OF AMERICAN RAILROADS	PG&E	PACIFIC GAS & ELECTRIC COMPANY	A-J	ALTAMONT PASS
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS	PUC	PUBLIC UTILITIES COMMISSION (STATE)	B-P	BAKERSFIELD TO PALMDALE
ACI	AMERICAN CONCRETE INSTITUTE	RSIA	RAIL SAFETY IMPROVEMENT ACT (2008)	F-B	FRESNO TO BAKERSFIELD
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	RWQCB	REGIONAL WATER QUALITY CONTROL BOARD (STATE)	F-J	SAN FRANCISCO TO SAN JOSE
AMTRAK	NATIONAL RAILROAD PASSENGER CORPORATION	SDG&E	SAN DIEGO GAS & ELECTRIC COMPANY	J-M	SAN JOSE TO MERCED
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	SDNR	SAN DIEGO NORTHERN RAILWAY	L-D	LOS ANGELES TO SAN DIEGO
ANSS	ADVANCED NATIONAL SEISMIC SYSTEM	SAVE	SOCIETY OF AMERICAN VALUE ENGINEERS	L-O	LOS ANGELES TO ANAHEIM
APWA	AMERICAN PUBLIC WORKS ASSOCIATION	SHOPP	STATE HIGHWAY OPERATION AND PROTECTION PROGRAM (FORMERLY HSOPP)	M-F	MERCED TO FRESNO
AREA	AMERICAN RAILWAY ENGINEERING ASSOCIATION	SHPO	STATE HISTORIC PRESERVATION OFFICER (STATE)	P-L	PALMDALE TO LOS ANGELES
AREMA	AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION	SJRRRA	SAN JOAQUIN REGIONAL RAIL AUTHORITY	S-M	SACRAMENTO TO MERCED
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS	SMUD	SACRAMENTO MUNICIPAL UTILITY DISTRICT	B	BAY SUBDIVISION
ASTM	ASTM INTERNATIONAL, AMERICAN SOCIETY OF TESTING & MATERIALS	SPTC	SOUTHERN PACIFIC TRANSPORTATION COMPANY	C	CAPITAL SUBDIVISION
ATC	APPLIED TECHNOLOGY COUNCIL	SSORC	SAFETY AND SECURITY OVERSIGHT AND REVIEW COMMITTEE	D	DESERT SUBDIVISION
AWS	AMERICAN WELDING SOCIETY	SVBX	SILICON VALLEY BERRYESSA EXTENSION	J	SAN JACINTO SUBDIVISION
BART	BAY AREA RAPID TRANSIT DISTRICT	SVRT	SILICON VALLEY RAPID TRANSIT	P	PACHECO SUBDIVISION
BDA	BRIDGE DESIGN AIDS (CALTRANS)	UPRR	UNION PACIFIC RAILROAD	S	SIERRA SUBDIVISION
BDD	BRIDGE DESIGN DETAILS (CALTRANS)	US	UNITED STATES	T	TONGVA SUBDIVISION
BDP	BRIDGE DESIGN PRACTICE (CALTRANS)	USCE	UNITED STATES (ARMY) CORPS OF ENGINEERS	ALA	ALAMEDA
BDS	BRIDGE DESIGN SPECIFICATIONS (CALTRANS)	USCG	UNITED STATES COAST GUARD	ALP	ALPINE
BNSF	BURLINGTON NORTHERN SANTA FE RAILWAY	USCS	UNITED SOIL CLASSIFICATION SYSTEM	AMA	AMADOR
CALNET	CALIFORNIA INTEGRATED TELECOMMUNICATIONS NETWORK	VTA	VALLEY TRANSPORTATION AUTHORITY (OF SANTA CLARA COUNTY)	BUT	BUTTE
CALTRANS	CALIFORNIA DEPARTMENT OF TRANSPORTATION			CAL	CALAVERAS
CBC	CALIFORNIA BUILDING CODE			CC	CONTRA COSTA
CBDM	CALIFORNIA DEPARTMENT OF TRANSPORTATION - BRIDGE DESIGN MANUAL			COL	COLUSA
CCR	CALIFORNIA CODE OF REGULATIONS			DN	DEL NORTE
CDC	CALIFORNIA HIGH-SPEED TRAIN DESIGN CRITERIA			ED	EL DORADO
CEC	CALIFORNIA ELECTRIC CODE			FRE	FRESNO
CEQA	CALIFORNIA ENVIRONMENTAL QUALITY ACT			GLE	GLENN
CFR	CODE OF FEDERAL REGULATIONS			HUM	HUMBOLDT
CHD	COUNTY HEALTH DEPARTMENT			IMP	IMPERIAL
CHP	CALIFORNIA DEPARTMENT OF HIGHWAY PATROL (STATE)			INY	INYO
CHST	CALIFORNIA HIGH-SPEED TRAIN			KER	KERN
CHSTP	CALIFORNIA HIGH-SPEED TRAIN PROJECT			KIN	KINGS
CIWMB	CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD (STATE)			LA	LOS ANGELES
CPH	CALIFORNIA PERMIT HANDBOOK			LAK	LAKE
CPUC	CALIFORNIA PUBLIC UTILITIES COMMISSION			LAS	LASSEN
CRR	COMMUTER RAIL PROGRAM (STATE)			MAD	MADERA
DOD	DEPARTMENT OF DEFENSE (FEDERAL)			MEN	MENDOCINO
DOT	DEPARTMENT OF TRANSPORTATION (FEDERAL)			MER	MERCED
DTX	DOWNTOWN EXTENSION (CALTRAIN)			MNO	MONO
EIRENE	EUROPEAN INTEGRATED RADIO ENHANCED NETWORK			MOD	MODOC
ERTMS	EUROPEAN RAIL TRAFFIC MANAGEMENT SYSTEM			MON	MONTEREY
FAA	FEDERAL AVIATION ADMINISTRATION			MPA	MARIPOSA
FCC	FEDERAL COMMUNICATIONS COMMISSION			MRN	MARIN
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY			NAP	NAPA
FHWA	FEDERAL HIGHWAY ADMINISTRATION			NEV	NEVADA
FMFCD	FRESNO METROPOLITAN FLOOD CONTROL DISTRICT			ORA	ORANGE
FRA	FEDERAL RAILROAD ADMINISTRATION			PLA	PLACER
FSTIP	FEDERAL STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM			PLU	PLUMAS
FTA	FEDERAL TRANSIT ADMINISTRATION			RIV	RIVERSIDE
GBR	GEOTECHNICAL BASELINE REPORT			SAC	SACRAMENTO
GBR-B	GEOTECHNICAL BASELINE REPORT FOR BIDDING			SB	SANTA BARBARA
GBR-C	GEOTECHNICAL BASELINE REPORT FOR CONSTRUCTION			SBD	SAN BERNADINO
GDR	GEOTECHNICAL DATA REPORT			SBT	SAN BENITO
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS			SCL	SANTA CLARA
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION			SCR	SANTA CRUZ
LADWP	LOS ANGELES DEPARTMENT OF WATER AND POWER			SD	SAN DIEGO
LAUS	LOS ANGELES UNION STATION			SHA	SAN FRANCISCO
LTC	LOCAL TRANSPORTATION COMMISSION			SIE	SHASTA
MUTCD	MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES			SIS	SIERRA
NAAQS	NATIONAL AMBIENT AIR QUALITY STANDARDS			SJ	SISKIYOU
NAC	NOISE ABATEMENT CRITERIA			SLO	SAN JOAQUIN
NBSSR	NOISE BARRIER SCOPE SUMMARY REPORT			SM	SAN LUIS OBISPO
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION			SOL	SAN MATEO
NENA	NATIONAL EMERGENCY NUMBER ASSOCIATION			SON	SOLANO
NESC	NATIONAL ELECTRICAL SAFETY CODE			STA	SONOMA
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION			SUT	STANISLAUS
NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY			TEH	SUTTER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION			TRI	TEHAMA
PEER	PACIFIC EARTHQUAKE ENGINEER RESEARCH			TUL	TRINITY

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY R. MINCIO	DRAWN BY V. HUANTE	CHECKED BY S. MILITELLO	IN CHARGE J. CHIRCO	DATE 01/24/2014

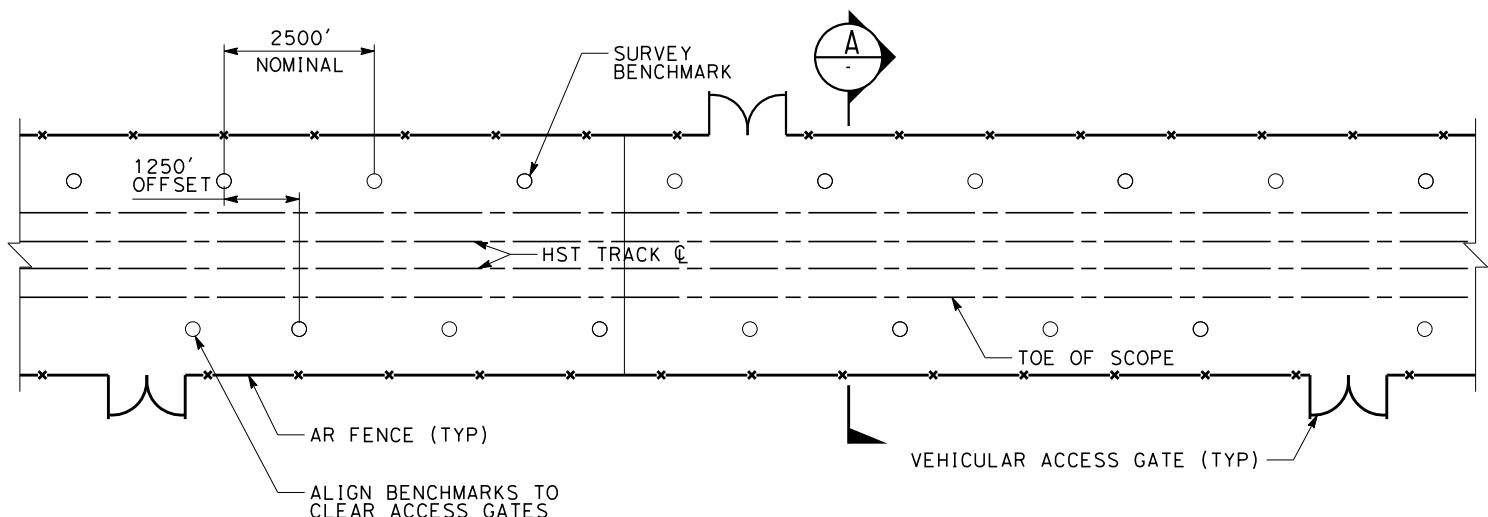
PARSONS
BRINCKERHOFFCALIFORNIA
HIGH-SPEED RAIL AUTHORITY
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING**

ACRONyms AND ABBREViations 5

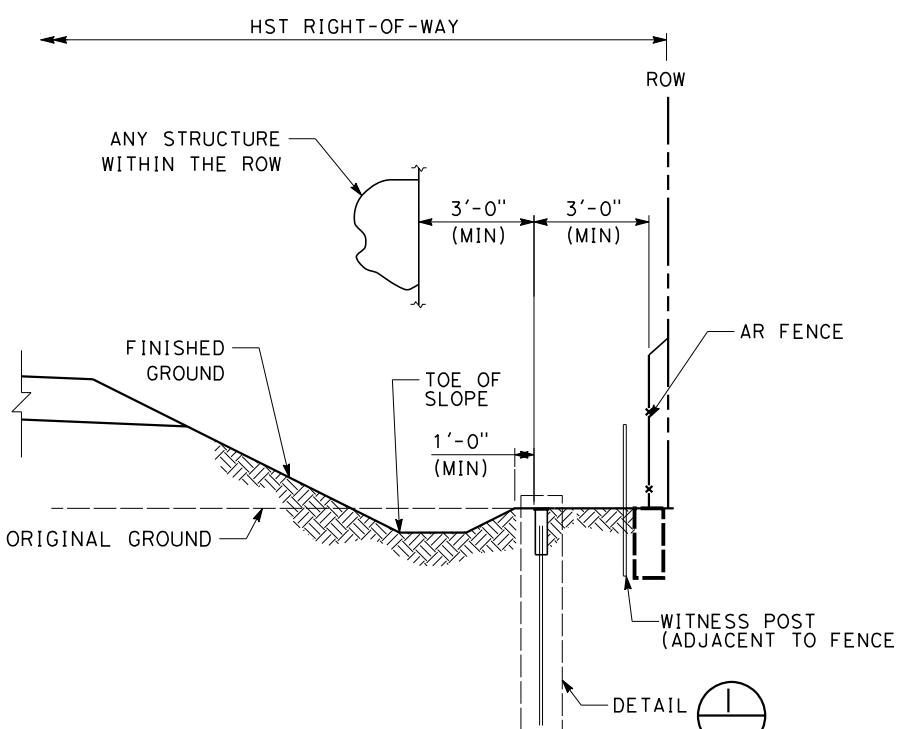
CONTRACT NO.	
DRAWING NO.	DD-GE-104
SCALE	NO SCALE
SHEET NO.	

NOTES:

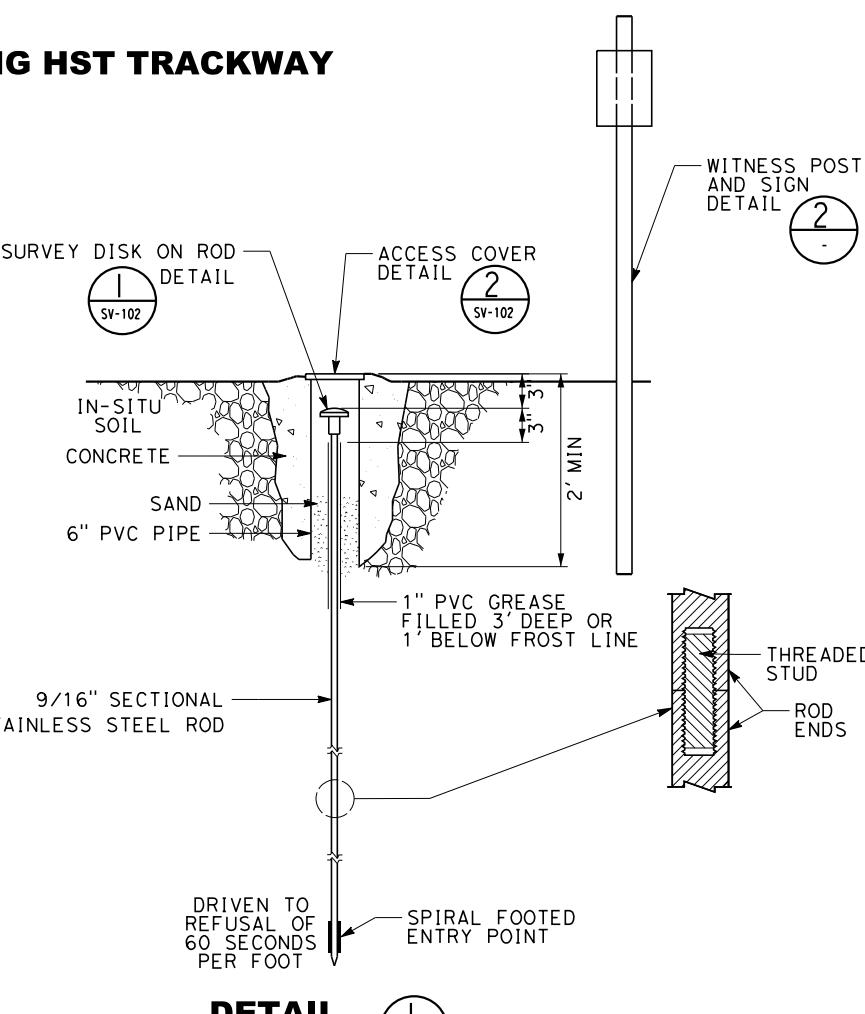
1. THIS DRAWING DEPICTS THE REQUIREMENTS OF PLACING SURVEY BENCHMARKS WITHIN THE AUTHORITY'S ROW DUE TO THE POSSIBLE PRESENCE OF GROUND SUBSIDENCE. BENCHMARKS TO BE PLACED ON EACH SIDE OF THE EMBANKMENT AT APPROXIMATELY 2500' INTERVALS WITH 1250' OFFSET ON EACH SIDE OF THE EMBANKMENT. ALL BENCHMARKS SHALL BE PLACED IN A CLEAR LINE OF SIGHT OF THE FUTURE TOP OF RAIL.
2. FOR ADDITIONAL INFORMATION ON BENCHMARK INSTALLATION REFER TO SURVEY MARKERS AND DOCUMENTATION, US ARMY CORPS OF ENGINEERS, EM 1110-1-1002, TYPE B MONUMENT-DEEP ROD.
3. PROVIDE A GPS BASED SURVEY OF THE MONITORING SURVEY BENCHMARKS.
4. ESTABLISH NON-MOVING BENCHMARK CONTROL POINT, SOME OF WHICH WILL BE LOCATED OUTSIDE OF THE CENTRAL VALLEY SUBSIDENCE AREA AND 20-30 MILES TO THE EAST OF THE SIERRA NEVADA FOOTHILLS
5. SUBMIT AS-BUILTS OF THE MONUMENTS GIVING EXACT COORDINATE LOCATIONS, ELEVATIONS, NUMBERING, INSTALLATION DATES, LENGTH OF RODS INSTALLED, AND OTHER PERTAINANT DATA.
6. INSTALL SURVEY BENCHMARKS AND OBTAIN BASELINE READINGS AGREED BY THE AUTHORITY AT LEAST 90 CALENDAR DAYS BEFORE THE START OF ANY CONSTRUCTION.
7. PROVIDE A WEB-BASED USER INTERFACE THAT CAN BE RUN FROM ANY WEB BROWSER TO ALLOW A COMPLETE REVIEW OF THE SURVEY DATA IN GRAPHICAL FORMAT. TABULATED DATA SHALL BE PRESENTED AS SHOWN ON DETAIL 3 ON DIRECTIVE DRAWINGS TITLED "SURVEY BENCHMARK DETAILS."
8. DO NOT DISCLOSE ANY SURVEY DATA TO ANY THIRD PARTIES OTHER THAN THE AUTHORITY OR OTHER APPROVED THIRD PARTIES AND DO NOT PUBLISH DATA FOR OTHER THAN PROJECT USE WITHOUT PRIOR WRITTEN CONSENT OF THE AUTHORITY. SEE DIRECTIVE DRAWING TITLED "SURVEY BENCHMARK" FOR CONTROL POINT TABLE REQUIREMENTS.
9. WITNESS POST SIGN SHALL BE MADE OF ALUMINUM WITH A THICKNESS OF 1/16 INCH, WITH A DURABLE DECAL. THE SIGN SHALL BE FASTENED TO THE POST EITHER USING GALVANIZED OR STAINLESS STEEL BOLTS, NUTS AND WASHER, WITH SAID BOLT BEING 3/8 INCH DIAMETER AND LONG ENOUGH TO PROTRUDE 1/2 INCH OR LONGER BEYOND THE REAR OF THE POST.



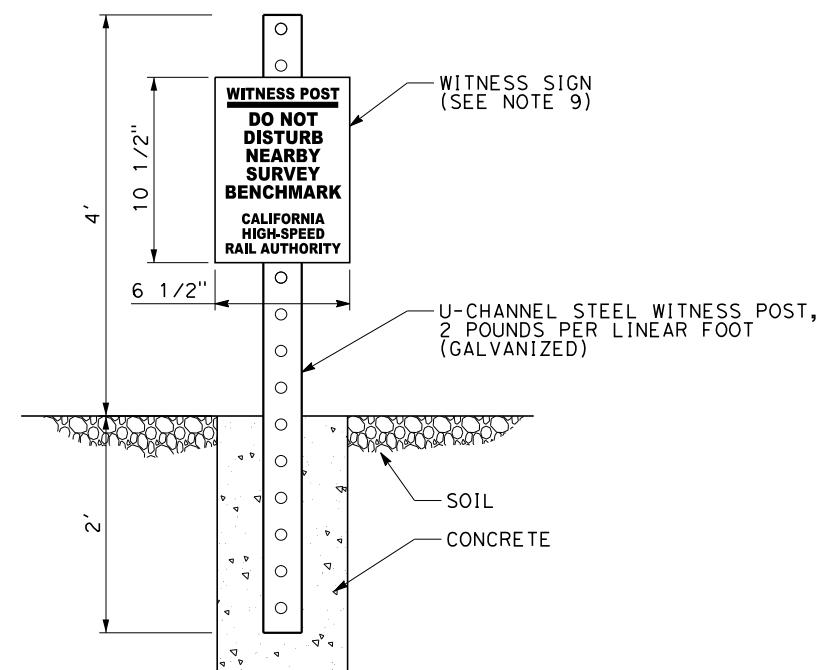
SURVEY BENCHMARK LOCATION ALONG HST TRACKWAY
EMBANKMENT



SURVEY BENCHMARK
EMBANKMENT



**TYPE B SURVEY BENCHMARK
DEEP ROD**



WITNESS POST AND SIGN

REV	DATE	BY	CHK	APP	DESCRIPTION	08/24/2015

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
SURVEY DIRECTIVE**

SURVEY BENCHMARK

CONTRACT NO.	
DRAWING NO.	DD-SV-101
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. THIS DRAWING DEPICTS THE REQUIREMENTS OF PLACING SURVEY BENCHMARKS WITHIN THE AUTHORITIES ROW DUE TO THE POSSIBLE PRESENCE OF GROUND SUBSIDENCE.
2. FOR ADDITIONAL INFORMATION ON BENCHMARK INSTALLATION REFER TO SURVEY MARKERS AND DOCUMENTATION, US ARMY CORPS OF ENGINEERS, EM 1110-1-1002, TYPE B MONUMENT-DEEP ROD.

SURVEY DATA

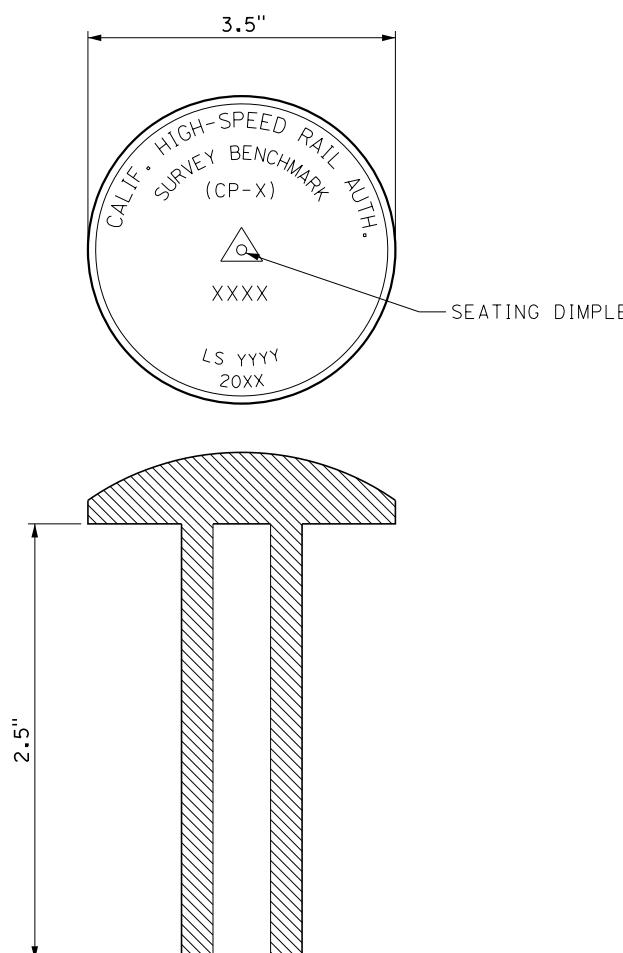
POINT NAME	LATITUDE	LONGITUDE	NORTHING	EASTING	GRID FACTOR	COMBINED FACTOR	CONVERGENCE	POINT ELEVATION	DESCRIPTION
------------	----------	-----------	----------	---------	-------------	-----------------	-------------	-----------------	-------------

COMPARISSON DATA

SURVEY DATA FROM YYYY/MM/DD*				DELTA		
POINT NAME	POINT ELEVATION	NORTHING	EASTING	ELEV	X SHIFT	Y SHIFT

XXXX INDICATES POINT DESIGNATION (NAME)
YYYY LAND SURVEYOR NUMBER
20XX INDICATES YEAR
CP-X INDICATES CONSTRUCTION PACKAGE

*SURVEY DATA SHALL BE COMPILED EVERY SIX MONTHS



DETAIL

SV-101

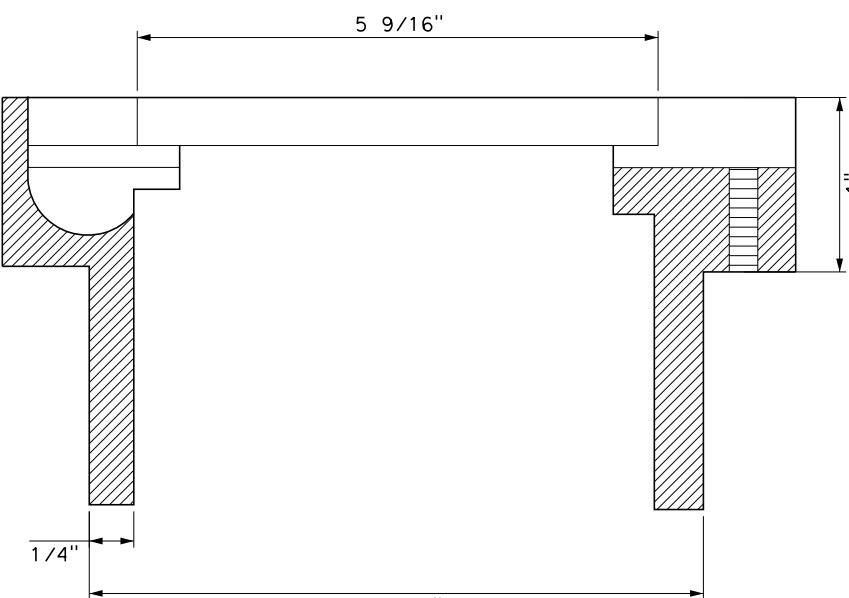
**SURVEY DISK
ON ROD**



DETAIL

3

SAMPLE BENCHMARK SURVEY DATA TABLE

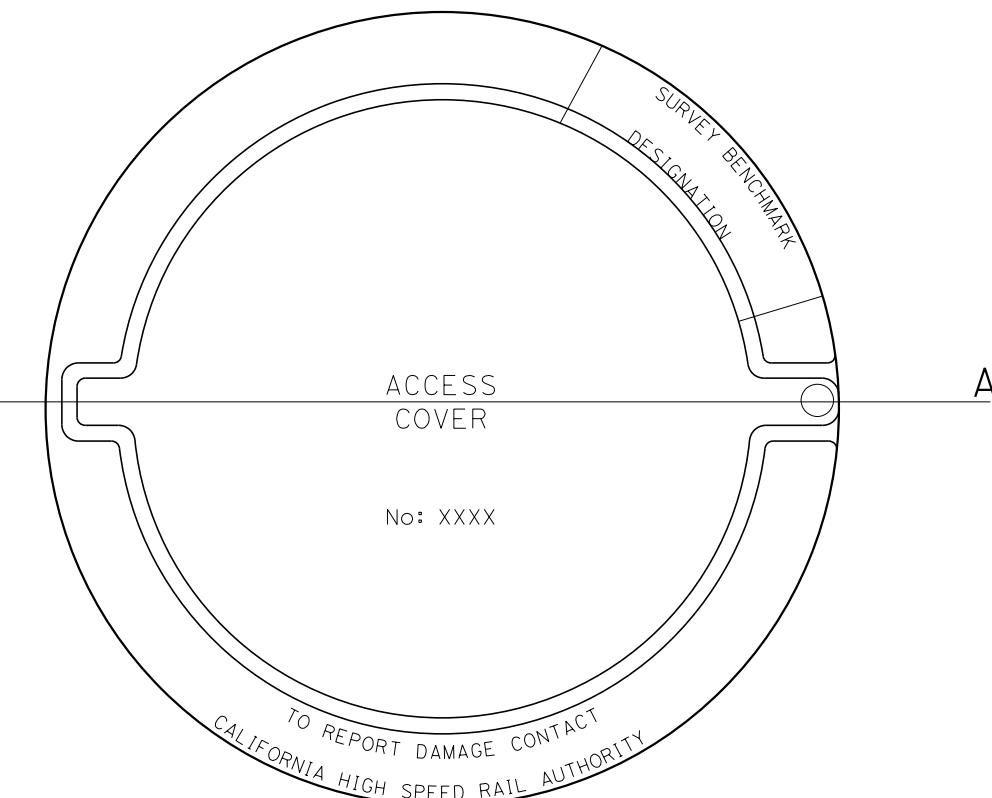


SECTION A-A

DETAIL

SV-101

ACCESS COVER

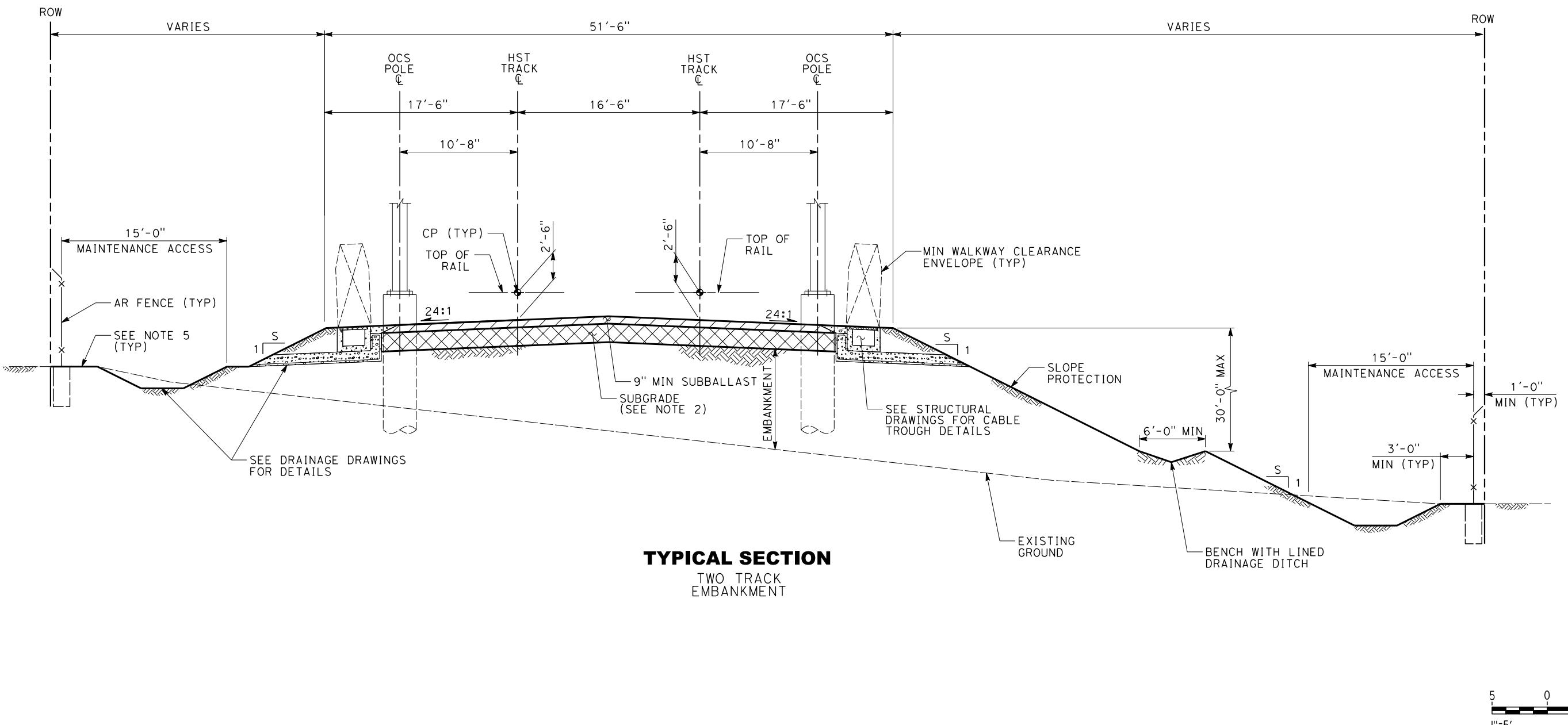


A

A

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



REV	DATE	BY	CHK	APP	DESCRIPTION
	01/24/2014				

**PARSONS
BRINCKERHOFF**

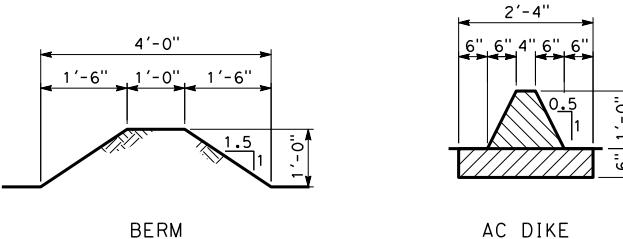


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
TYPICAL CROSS SECTION
TWO TRACK
EMBANKMENT

CONTRACT NO.	
DRAWING NO.	DD-CV-100
SCALE	AS SHOWN
SHEET NO.	

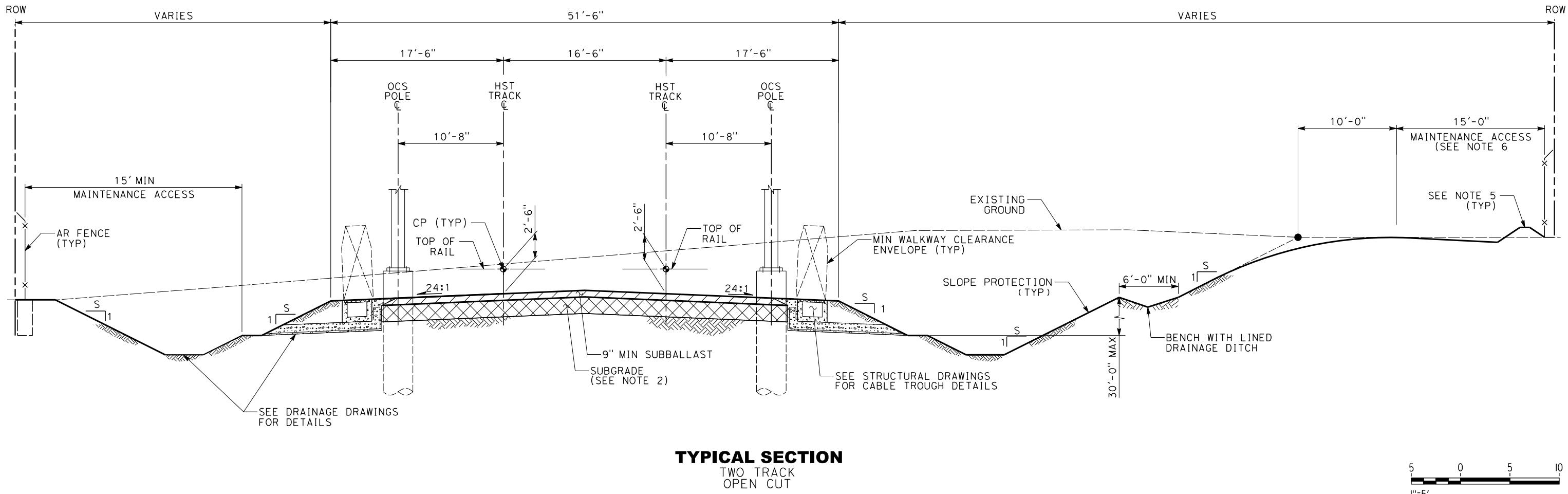
NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.



PROTECTIVE BARRIER DETAILS

[SEE NOTE 5)



CALIFORNIA HIGH-SPEED RAIL AUTHORITY

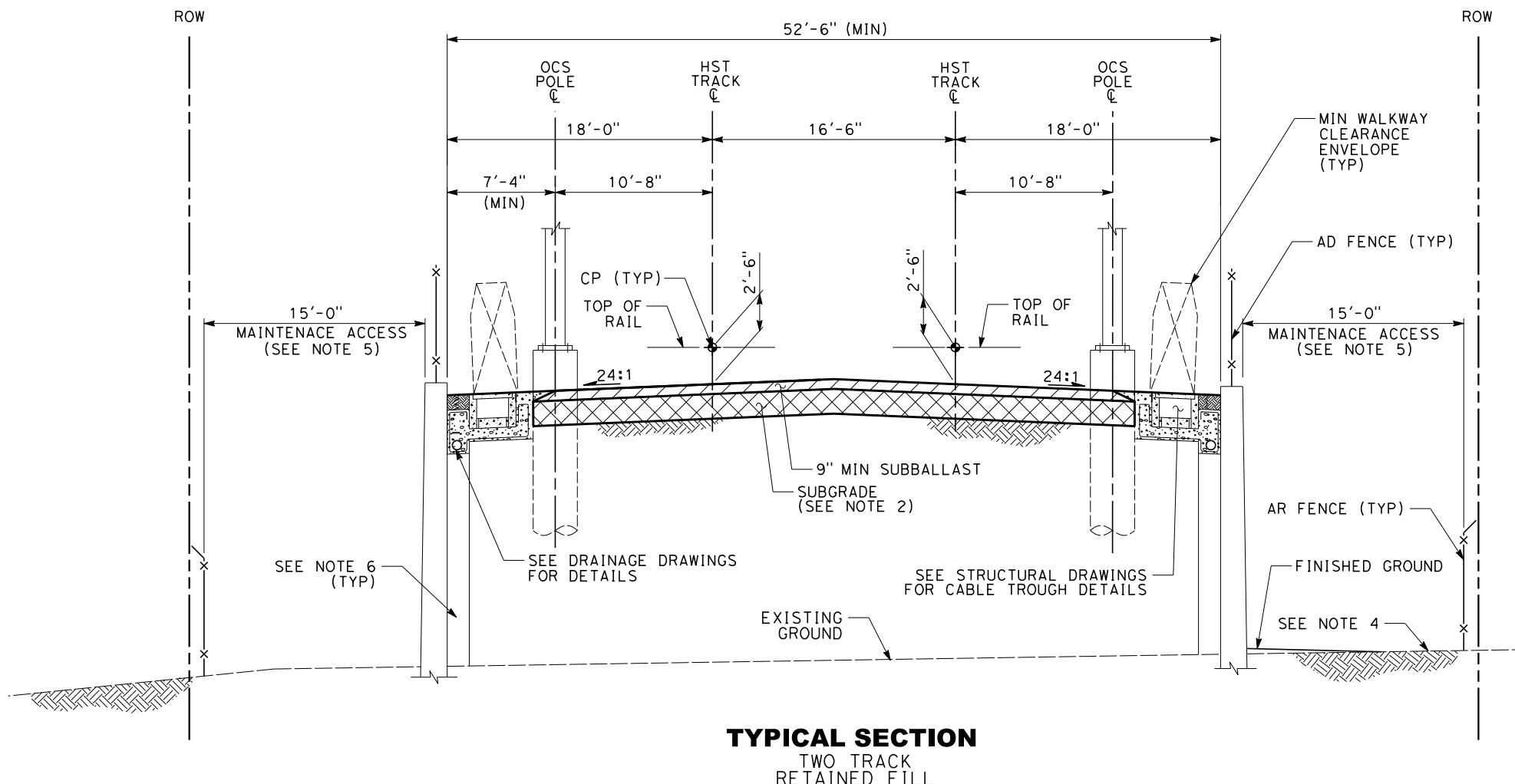
CALIFORNIA HIGH-SPEED TRAIN PROJECT CIVIL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK
OPEN CUT

CONTRACT NO.
DRAWING NO.
DD-CV-101
SCALE
AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHSR RIGHT-OF-WAY FROM ADJACENT PROPERTY.
5. 10' MIN MAINTENANCE ACCESS REQUIRED WHEN THERE IS NO FENCE OR CONTINUOUS OBSTRUCTION.
6. PROVIDE APPROPRIATE DRAINAGE SYSTEM FOR THE TYPE OF RETAINING WALL.

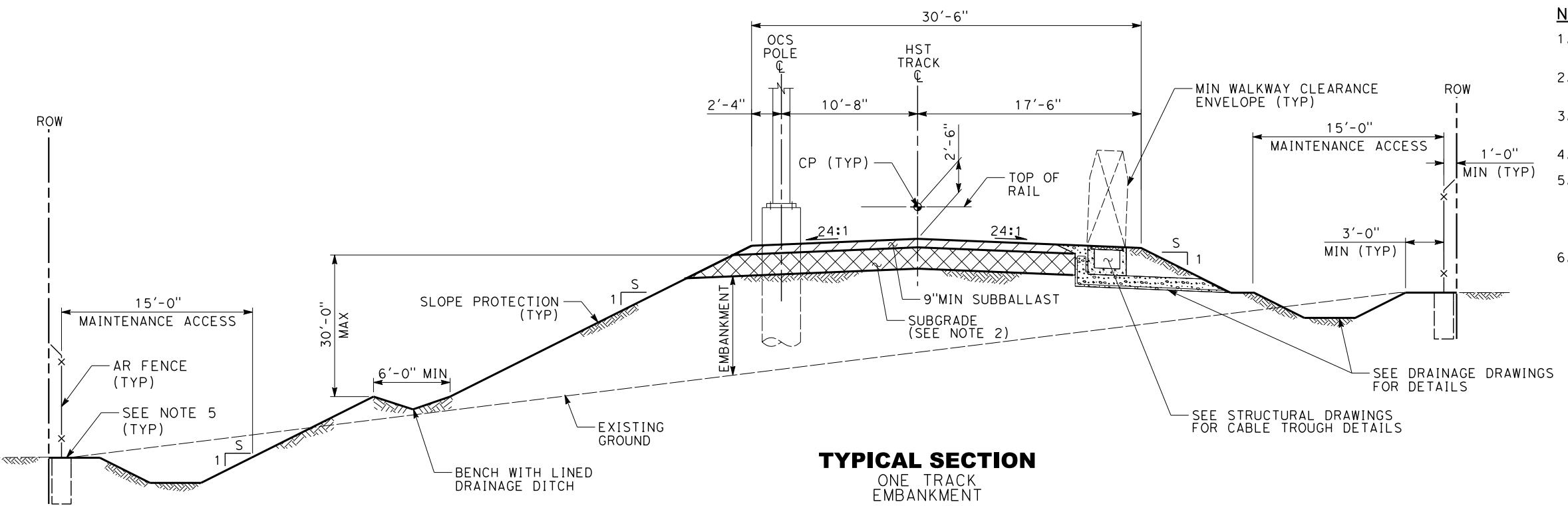


5 0 5 10
1'=5'

DESIGNED BY S. MILITELLO	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED TRAIN PROJECT CIVIL DIRECTIVE				CONTRACT NO.
DRAWN BY R. MINCIO		DRAWING NO.	DD-CV-102			
CHECKED BY G. HARRIS		SCALE	AS SHOWN			
IN CHARGE G. LUSHEROVICH		SHEET NO.				
DATE 08/29/2014		REV DATE BY CHK APP	DESCRIPTION	TYPICAL CROSS SECTION TWO TRACK RETAINED FILL		

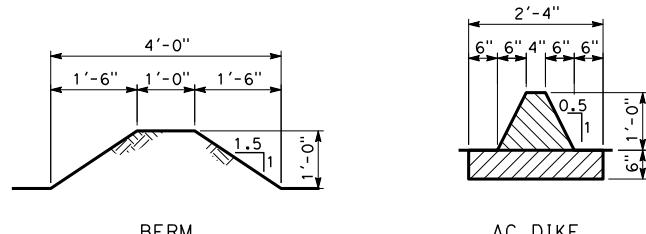
NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.

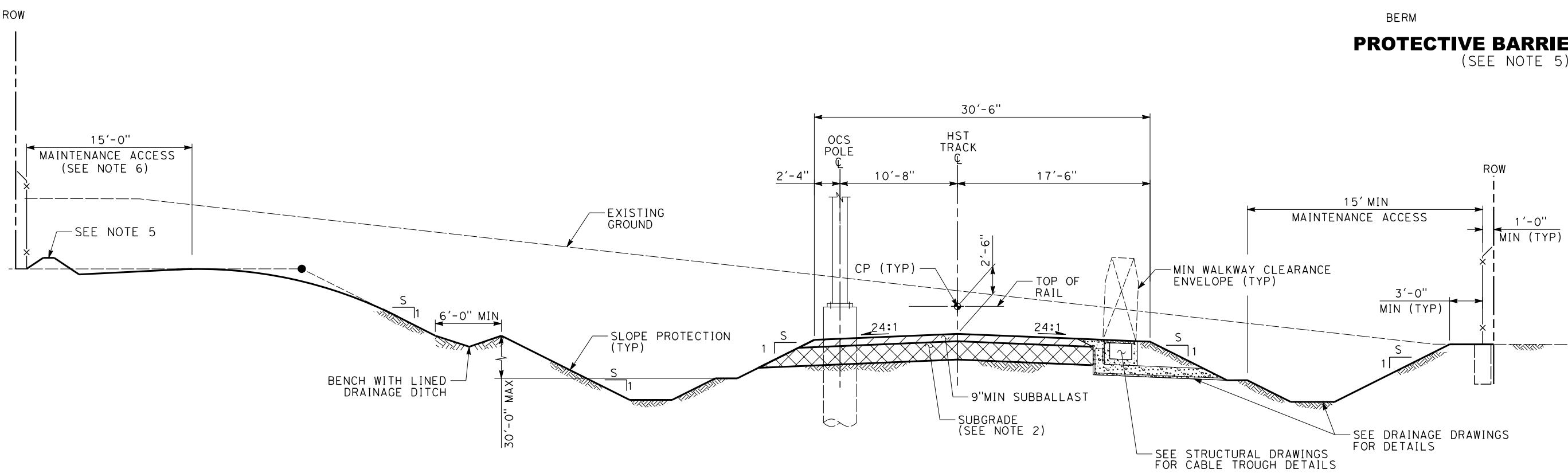


TYPICAL SECTION

ONE TRACK
EMBANKMENT



PROTECTIVE BARRIER DETAILS (SEE NOTE 5)



TYPICAL SECTION

ONE TRACK
OPEN CUT



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY D. MANITI	DRAWN BY R. MINCIO	CHECKED BY G. HARRIS	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



CALIFORNIA HIGH-SPEED TRAIN PROJECT

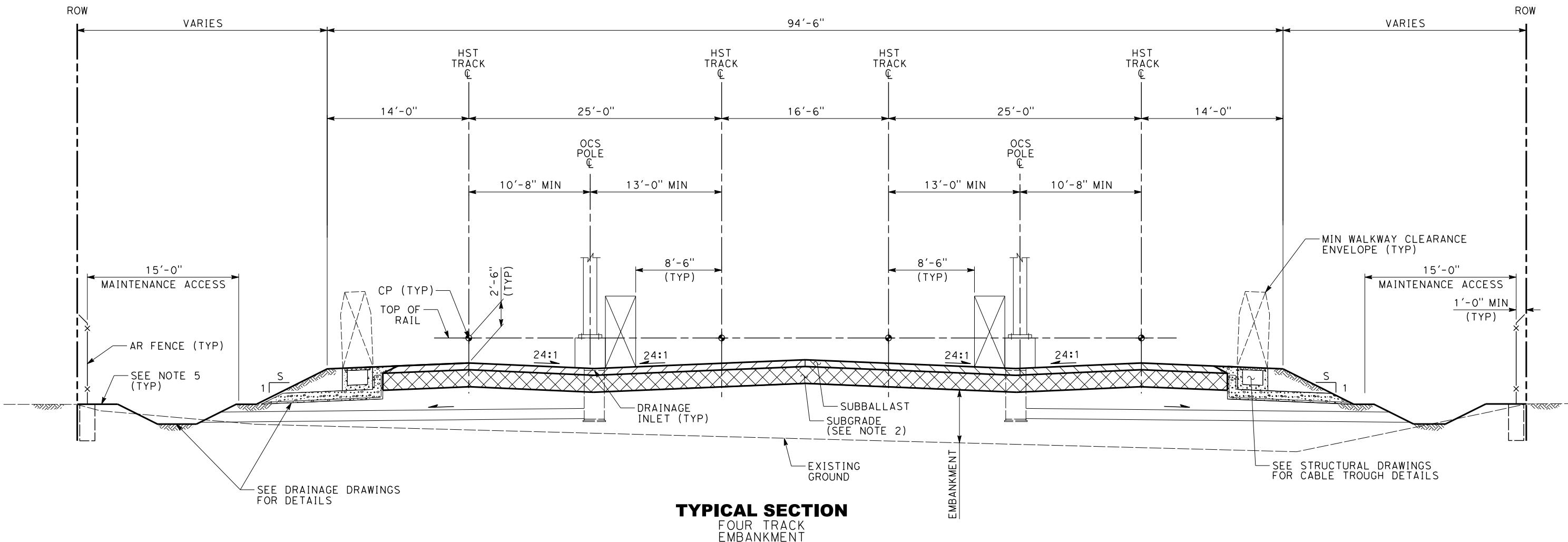
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
ONE TRACK
EMBANKMENT AND OPEN CUT

CONTRACT NO.
DRAWING NO. DD-CV-103
SCALE AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHSR RIGHT-OF-WAY FROM ADJACENT PROPERTY.



5 0 5 10
1"=5'

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY D. MANITI	DRAWN BY R. MINCIO	CHECKED BY G. HARRIS	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014
3/28/2014 3:32:46 PM	CAHSRP.tbl	CHSR_half_black.plt	c:\projectwise\pb\projectwiseint\mincio\dms32166\DD-CV-104.dgn							

**PARSONS
BRINCKERHOFF**



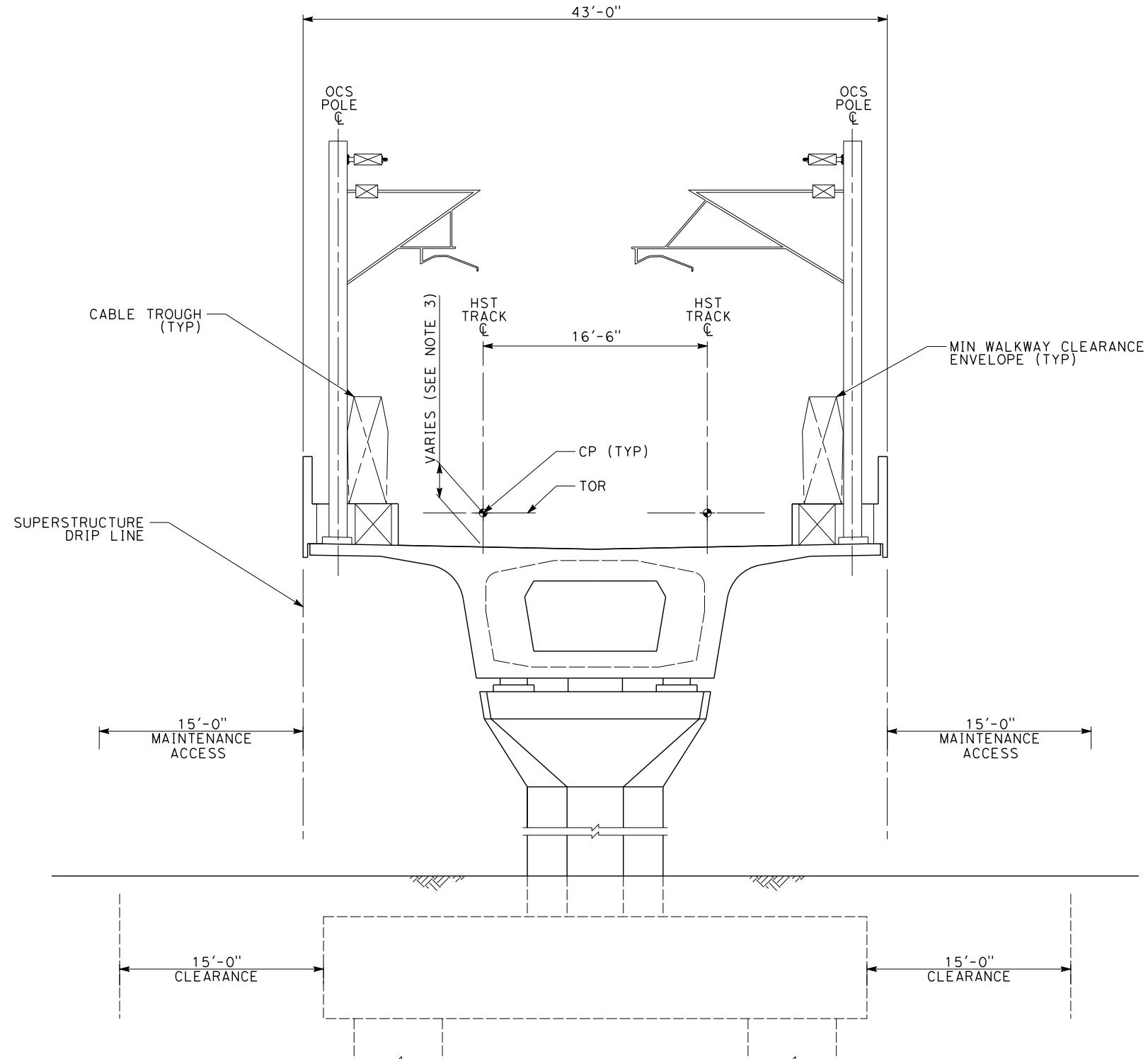
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

**TYPICAL CROSS SECTION
FOUR TRACK
EMBANKMENT**

CONTRACT NO.	
DRAWING NO.	DD-CV-104
SCALE	AS SHOWN
SHEET NO.	

NOTES:

- STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
- SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
- THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF STRUCTURE WITH NON-BALLASTED TRACK. FOR BALLASTED TRACK THE CONTROL POINT (CP) SHALL BE LOCATED ABOVE STRUCTURE DECK AT A DISTANCE 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER (IF REQUIRED).
- PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



TYPICAL SECTION
AERIAL TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY D. MANITI	DRAWN BY R. MINCIO	CHECKED BY G. HARRIS	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**

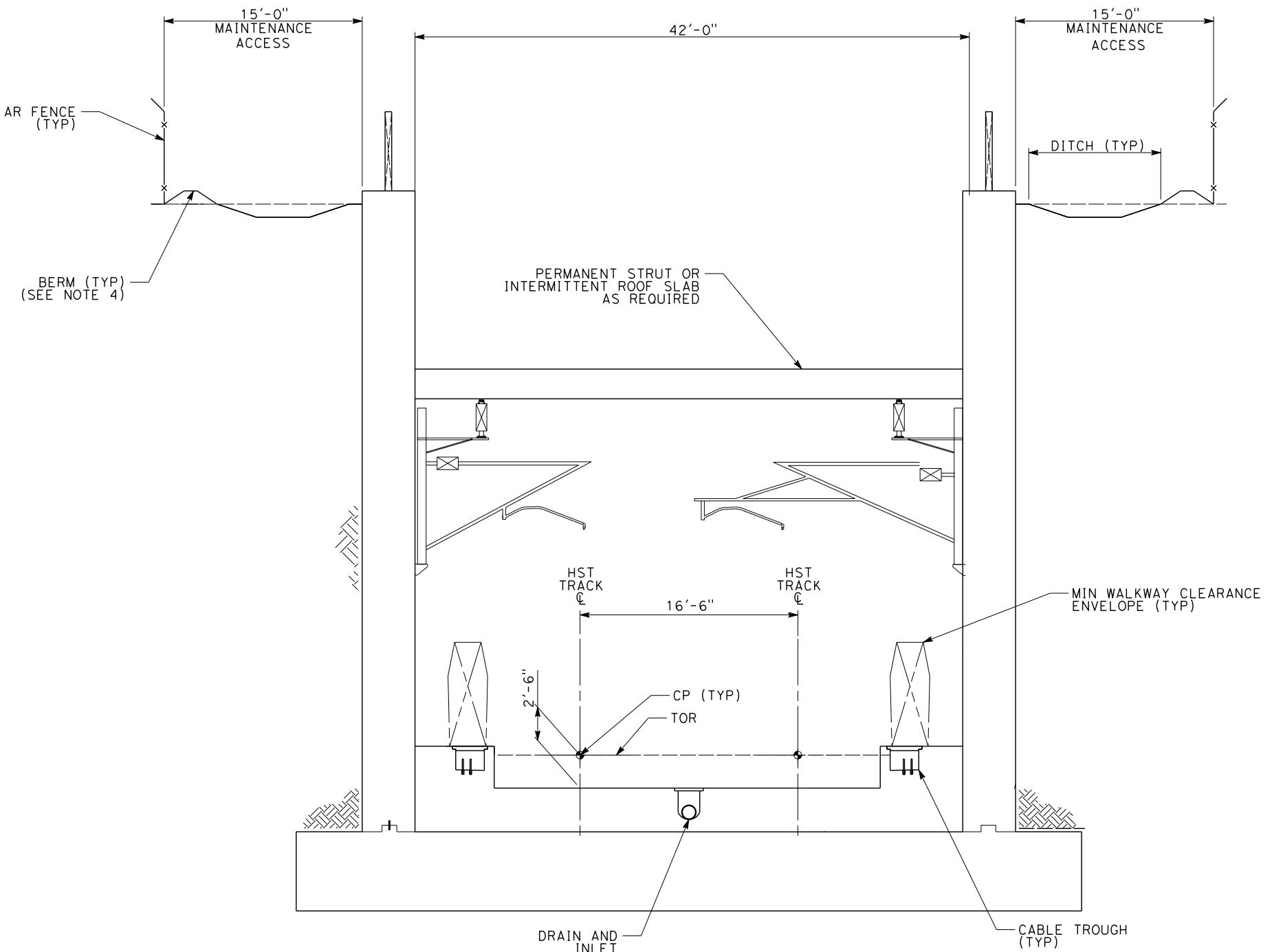


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
TYPICAL CROSS SECTION
TWO TRACK
AERIAL TRACKWAY

CONTRACT NO.
DRAWING NO. DD-CV-105
SCALE AS SHOWN
SHEET NO.

NOTES:

- STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
- SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
- THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
- PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



TYPICAL SECTION
TRENCH

REV	DATE	BY	CHK	APP	DESCRIPTION
	01/24/2014				

DESIGNED BY
D. MANITI

DRAWN BY
R. MINCIO

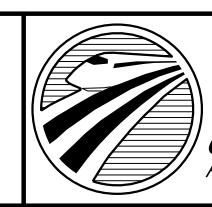
CHECKED BY
G. HARRIS

IN CHARGE
G. LUSHEROVICH

DATE

01/24/2014

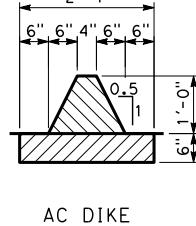
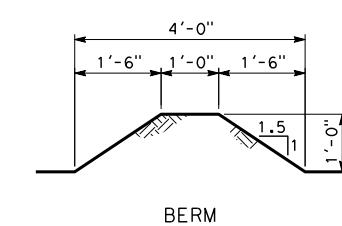
**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
TYPICAL CROSS SECTION
TWO TRACK
TRENCH STRUCTURE

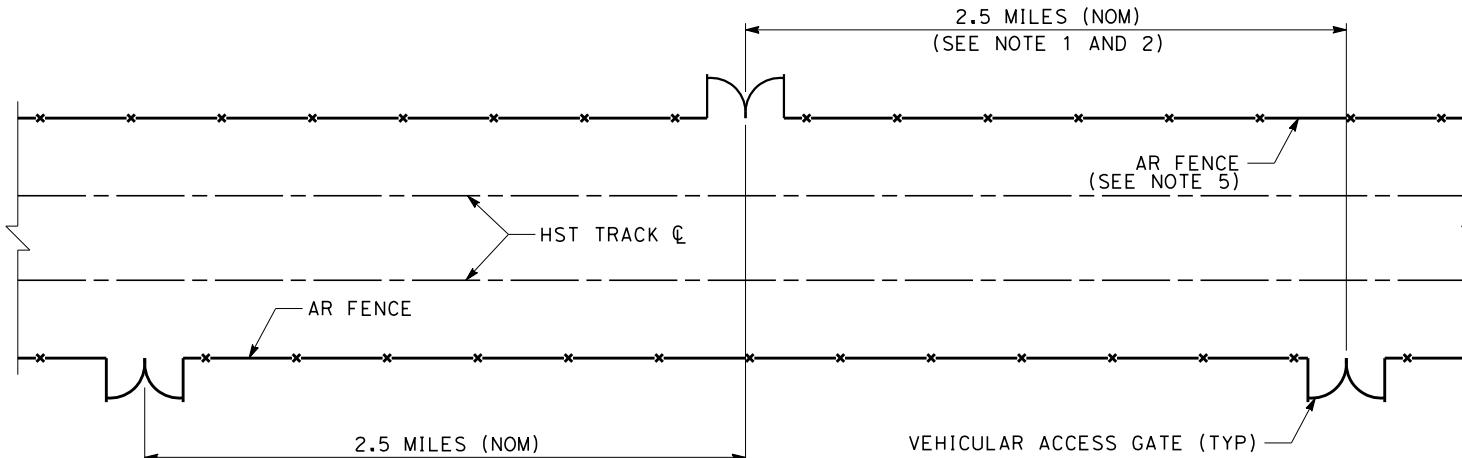
CONTRACT NO.	
DRAWING NO.	DD-CV-106
SCALE	AS SHOWN
SHEET NO.	



PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)

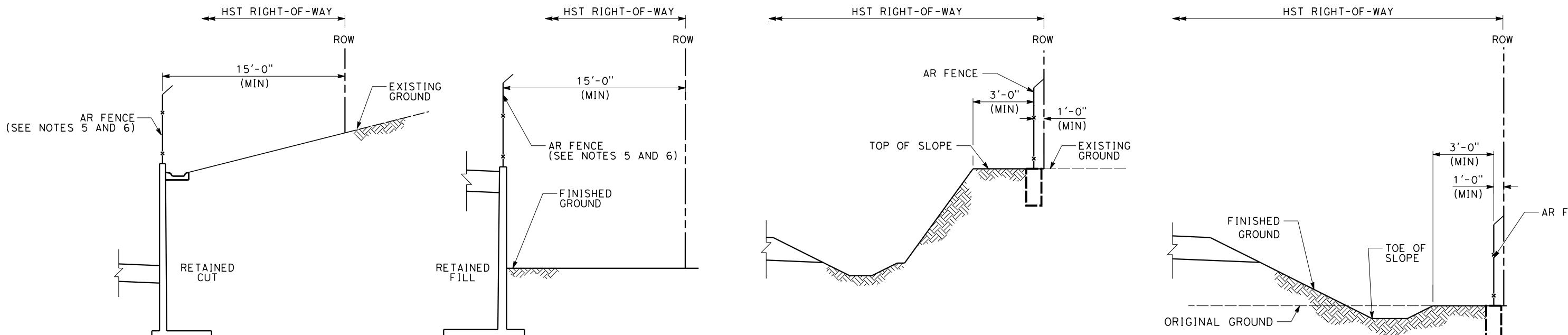
NOTES:

1. LOCATION OF GATES ALONG RIGHT-OF-WAY FENCING MAY REQUIRE COORDINATION WITH THE LOCAL FIRE PROTECTION AGENCY AND EMERGENCY RESPONDERS.
2. IN GENERAL VEHICULAR ACCESS GATE ALONG AT-GRADE TRACKWAY, SHALL BE LOCATED NOMINALLY AT 2.5 MILE INTERVALS AND COORDINATED WITH THE LOCATION OF HST WAYSIDE FACILITIES.
3. GATE LOCATIONS ALONG FENCING WITHIN FREEWAY RIGHT-OF-WAY REQUIRE CALTRANS APPROVAL.
4. VEHICULAR ACCESS GATES SHALL BE PROVIDED IN CONJUNCTION WITH EITHER ACCESS ROADS OR AT LOCATIONS WHERE EXISTING ROADS MAKE IT PRACTICABLE FOR MAINTENANCE AND EMERGENCY VEHICLE TO ACCESS THE TRACKWAY.
5. FOR ADDITIONAL DETAILS SEE CIVIL DRAWING "ACCESS RESTRICTION FENCE AND GATE DETAILS".
6. AD FENCE CAN BE USED IF AR FENCE IS PLACED ALONG THE RIGHT-OF-WAY OR THE HEIGHT OF THE WALL IS GREATER THAN 10 FEET. 15 FOOT MINIMUM REQUIRED TO THE FENCE WHEN AD FENCE IS PLACED ALONG THE RIGHT-OF-WAY.



GATE LOCATIONS ALONG HST TRACKWAY

AT GRADE



**FENCE LOCATION ALONG
HST TRACKWAY**
RETAINED CUT SECTION

**FENCE LOCATION ALONG
HST TRACKWAY**
RETAINED FILL SECTION

**FENCE LOCATION ALONG
HST TRACKWAY**
OPEN CUT SECTION

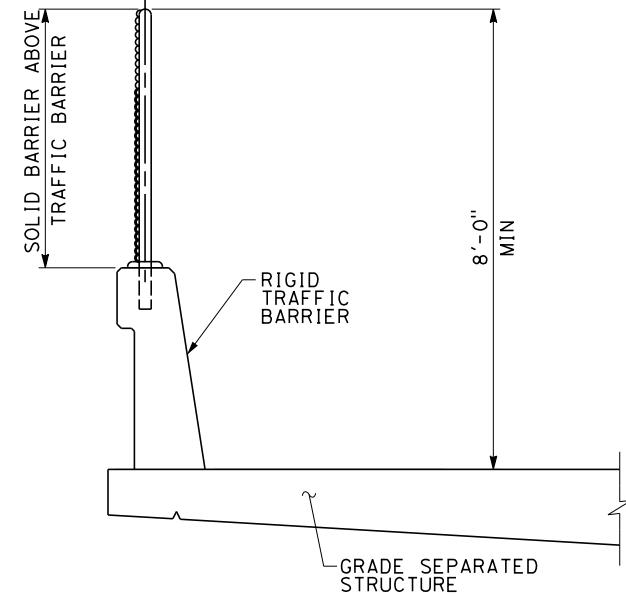
**FENCE LOCATION ALONG
HST TRACKWAY**
EMBANKMENT SECTION

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY S. MILITELLO	DRAWN BY V. LAVERDE	CHECKED BY A. ABTAHI	IN CHARGE G. LUSHEROVICH	DATE 08/29/2014	CONTRACT NO.	DRAWING NO.	SCALE	SHEET NO.
												DD-CV-901	NO SCALE	

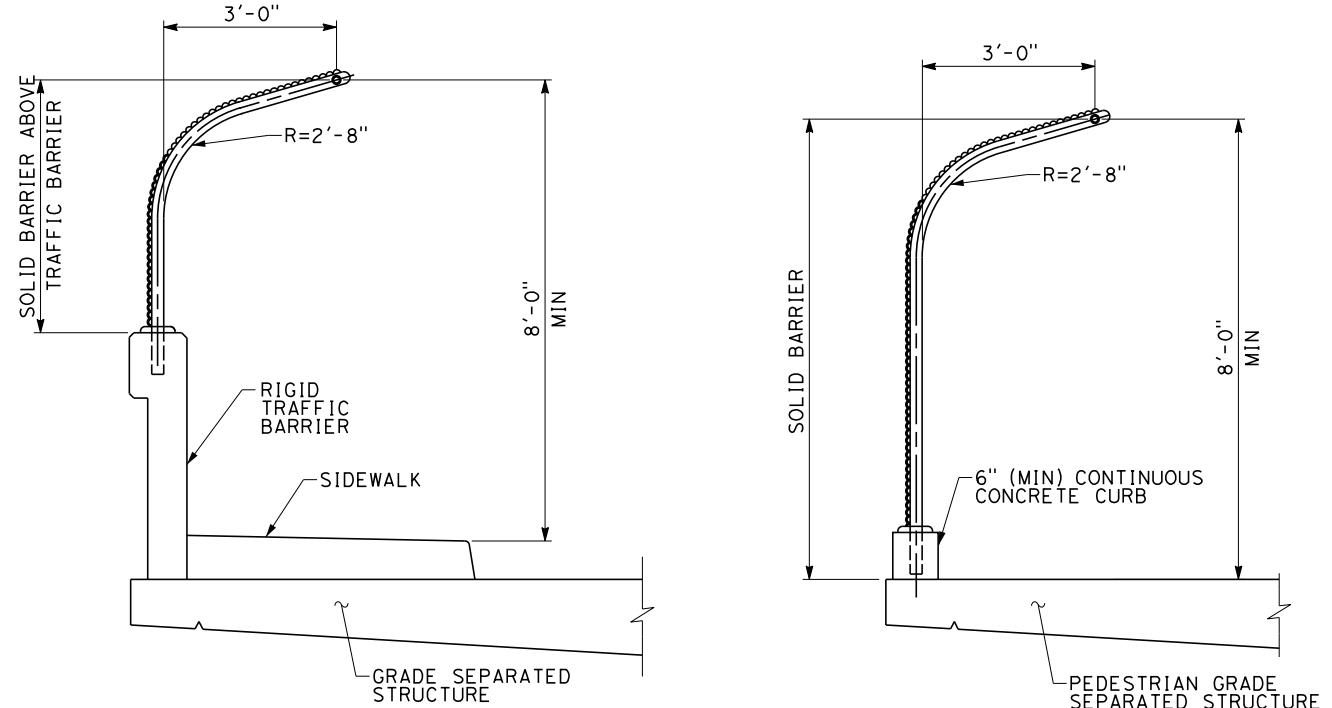
**PARSONS
BRINCKERHOFF**



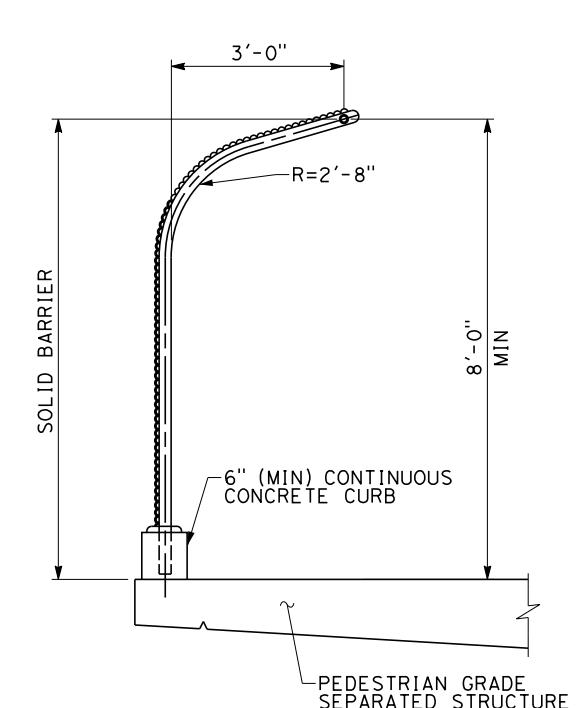
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
ACCESS RESTRICTION
FENCE AND GATE LOCATIONS



CROSS SECTION
SOLID BARRIER AT GRADE SEPARATED
STRUCTURES WITHOUT SIDEWALK



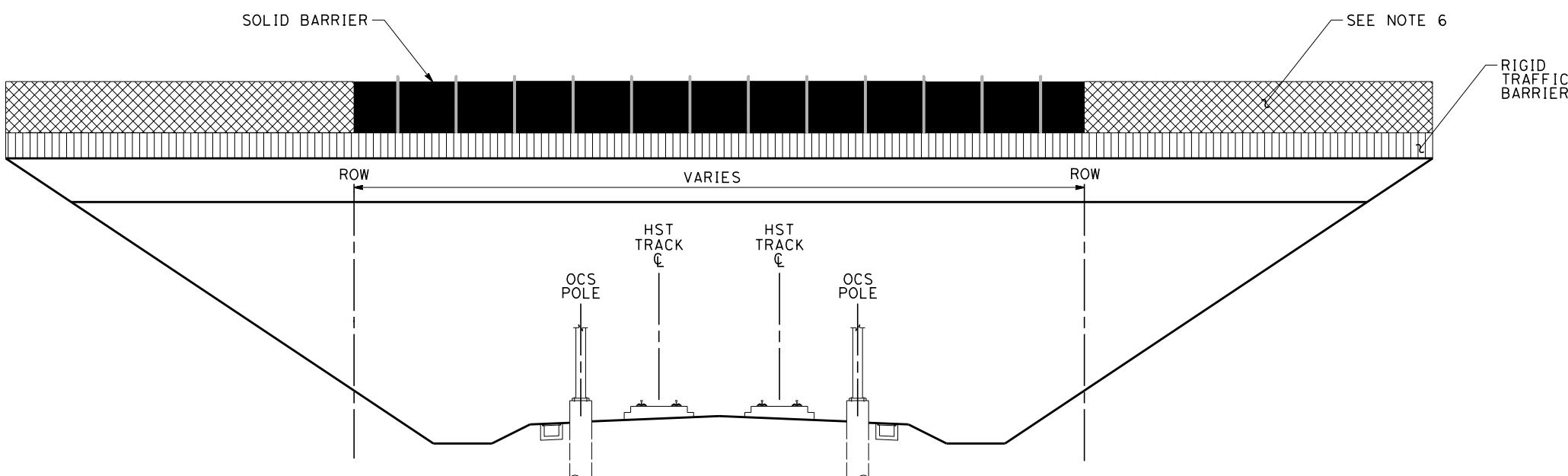
CROSS SECTION
SOLID BARRIER AT GRADE SEPARATED
STRUCTURES WITH SIDEWALK



CROSS SECTION
SOLID BARRIER AT PEDESTRIAN
GRADE SEPARATED STRUCTURE

NOTES:

1. TRACK, SYSTEMS, STRUCTURES AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE SOLID BARRIER SHALL BE AN OPAQUE SOLID PLATE WEIGHING NO MORE THAN 40 POUNDS PER LINEAR FOOT. SOLID BARRIER TO BE SUBMITTAL FOR AUTHORITY APPROVAL.
3. FOR PEDESTRIAN GRADE SEPARATED STRUCTURES A CONTINUOUS CONCRETE SURB SHALL BE USED.
4. FOR ADDITIONAL SOLID BARRIER REQUIREMENTS RELATED TO OCS, SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM CHAPTER OF THE DESIGN CRITERIA.
5. EXTEND SOLID BARRIER 30 FEET FROM CENTERLINE OF OUTERMOST TRACK, OR 10 FEET BEYOND THE OUTERMOST ENERGIZED CONDUCTOR OR COMPONENT, WHICHEVER IS GREATER.
6. FENCING OR RAILING AS REQUIRED BY CALTRANS OR AGENCY HAVING JURISDICTION.



OVERHEAD STRUCTURE ELEVATION

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. LAVERDE CHECKED BY S. MILITELLO IN CHARGE G. LUSHEROVICH DATE 09/18/2015

**PARSONS
BRINCKERHOFF**

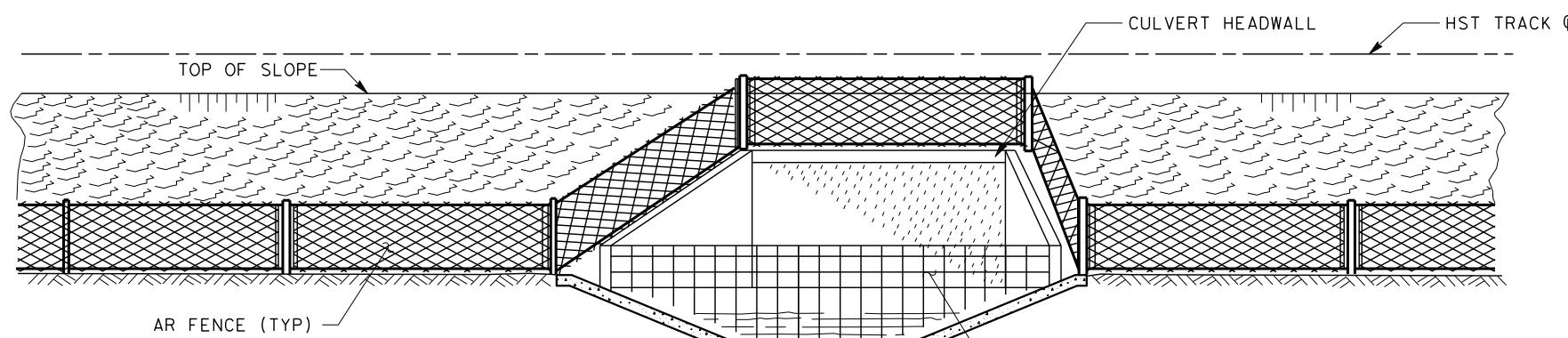
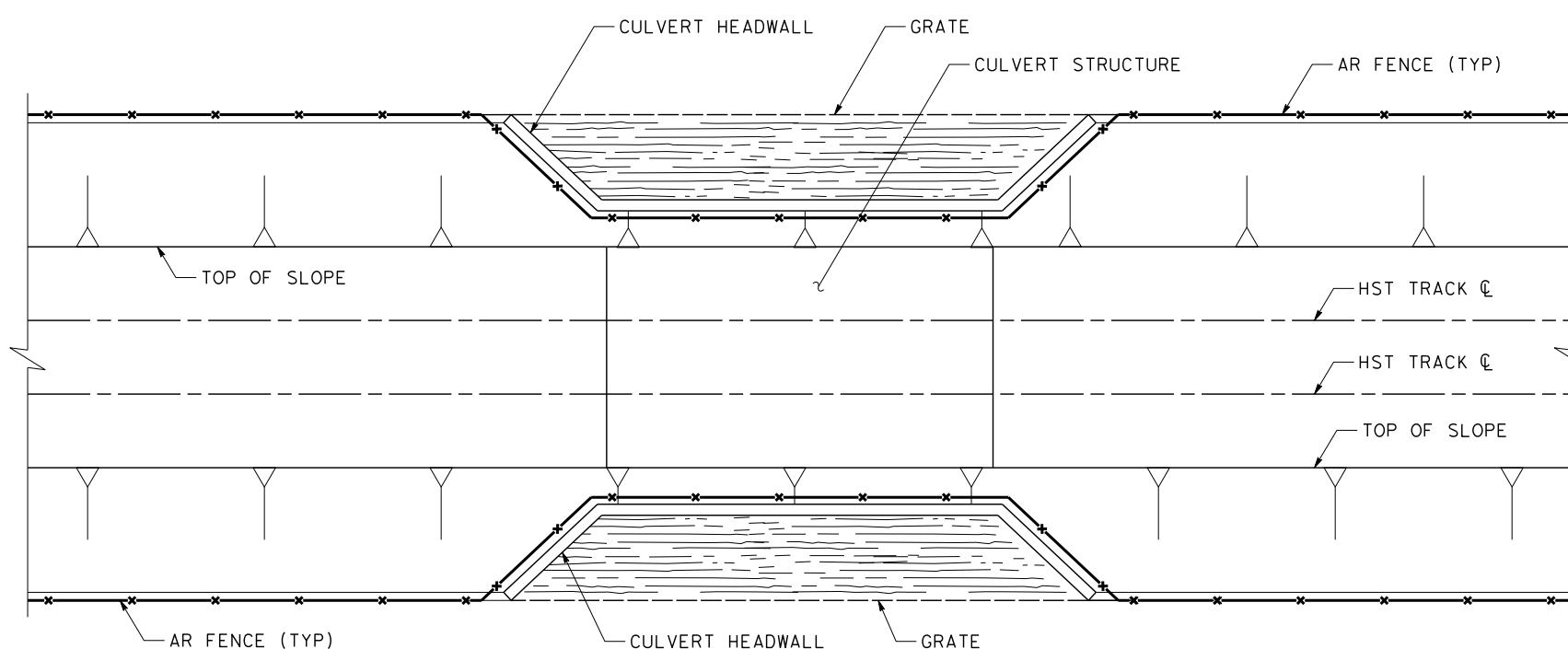


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
ACCESS DETERRING
SOLID BARRIER ON GRADE SEPARATED STRUCTURES

CONTRACT NO.
DRAWING NO. DD-CV-902
SCALE NO SCALE
SHEET NO.

NOTES:

1. CULVERT STRUCTURE IS SCHEMATIC AND DOES NOT REPRESENT DESIGN.
2. INSTALL GRATE IN THE CULVERT IF REQUIRED BY THREAT AND VULNERABILITY ANALYSIS, USING THE FOLLOWING CRITERIA:
 - A. GRATES SHALL BE INSTALLED UPSTREAM AND DOWNSTREAM OF CULVERT HEADWALLS.
 - B. GRATES SHALL HAVE BARS SPACED 6 INCHES APART AND SHALL BE DESIGNED TO WITHSTAND MAXIMUM IMPACT FROM LARGEST EXPECTED FLOATING DEBRIS.
 - C. THE MAXIMUM DISTANCE FROM THE BOTTOM OF THE GRATE TO THE BOTTOM AND SIDE SLOPES OF THE WATERWAY CROSSING SHALL BE 6 INCHES.
 - D. THE MINIMUM HEIGHT OF THE GRATES SHALL BE SUCH THAT IT RESTRICTS ACCESS DURING ALL CONDITIONS (DRY, HIGH WATER, ETC).
 - E. GRATE INSTALLATIONS SHALL BE COORDINATED WITH THE HYDRAULIC ENGINEER TO ENSURE PRESERVATION OF THE CULVERT FLOW CAPACITY.
3. INSTALLATION OF GRATES IN DESIGNATED WILDLIFE CORRIDORS ARE SUBJECT TO APPROVAL BY THE APPROPRIATE REGULATORY AGENCY.

**ELEVATION****PLAN**

REV	DATE	BY	CHK	APP	DESCRIPTION
					01/24/2014

**PARSONS
BRINCKERHOFF**

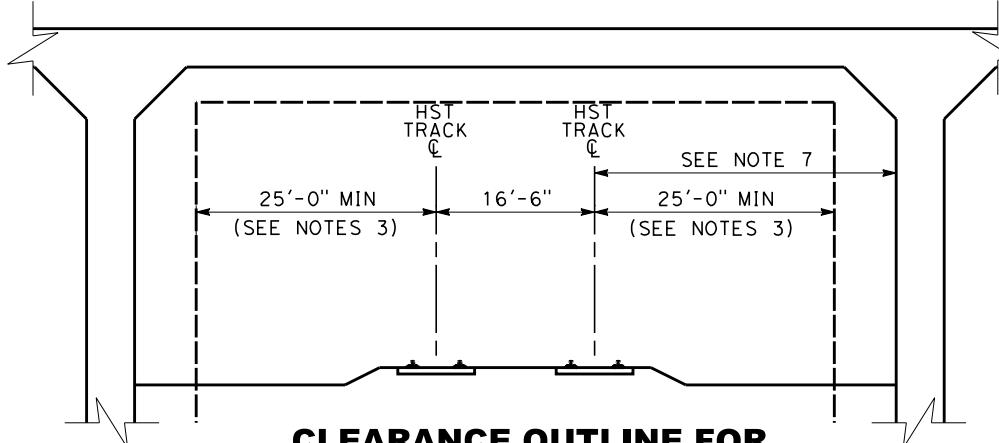
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

FENCE AT CULVERT CROSSINGS

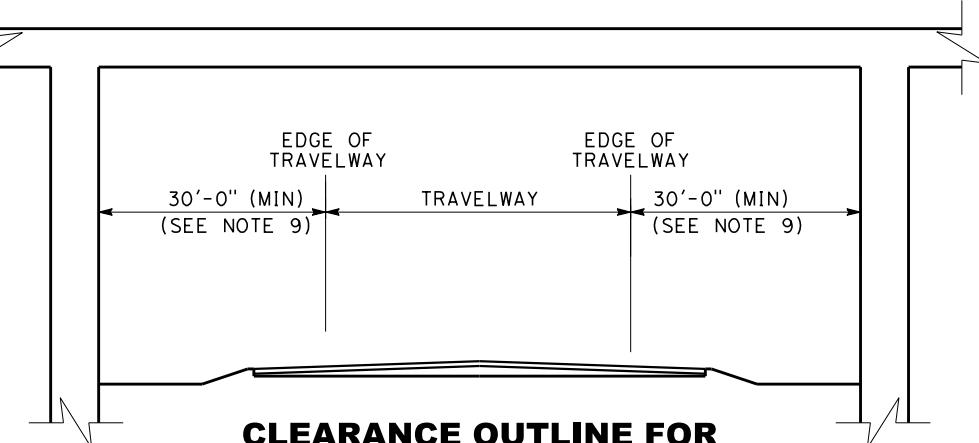
CONTRACT NO.	
DRAWING NO.	DD-CV-903
SCALE	NO SCALE
SHEET NO.	

NOTES:

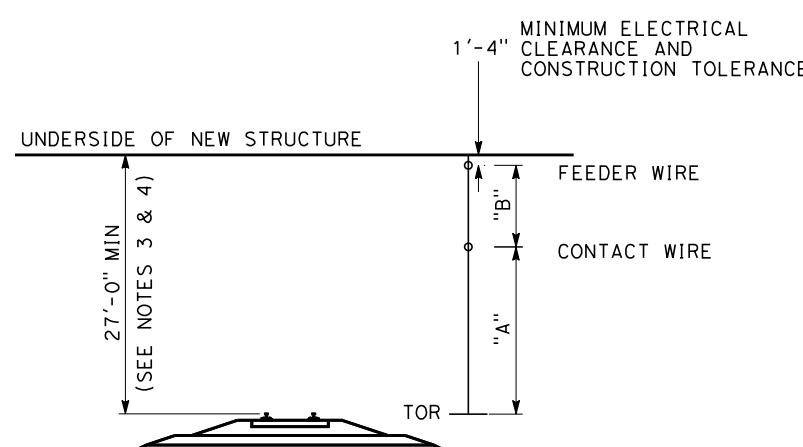
1. TOLERANCES ARE NOT ADDITIVE FOR INCREMENTAL DISTANCES.
2. HST TRACKFORM IS SCHEMATIC AND DOES NOT REPRESENT THE DESIGN.
3. AT LOCATIONS WHERE SUPERELEVATION IS PRESENT, VERTICAL CLEARANCES SHALL BE MEASURED FROM THE HIGH RAIL. MINIMUM VERTICAL CLEARANCES SHOULD BE CARRIED TO POINT 25 FEET LATERALLY FROM THE CENTERLINE OF THE MOST OUTSIDE TRACK.
4. DEFINED CLEARANCES ASSUMES GRADE SEPARATED STRUCTURE LENGTH ALONG TRACK IS NO MORE THAN 160 FEET FOR HST TRACK OVER 125 MPH. THE OCS SHALL BE FREE RUNNING UNDER GRADE SEPARATED STRUCTURES WITH NO SUPPORTS. STRUCTURES WIDER THAN 160 FEET REQUIRE FURTHER APPROVAL.
5. PROTECTIVE PANEL IS REQUIRED FOR VERTICAL CLEARANCES LESS THAN THE PANTOGRAPH ZONE HEIGHT (26 FEET - 3 INCHES) FOR STRUCTURES OVER HST TRACKS.
6. FOR LOCAL ROADWAYS, 15 FEET MINIMUM VERTICAL CLEARANCE SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.
7. ADDITIONAL HORIZONTAL CLEARANCE SHALL BE PROVIDED AS NECESSARY TO MEET DRAINAGE AND MAINTENANCE ACCESS REQUIREMENTS PER THE CIVIL AND DRAINAGE CHAPTERS OF THE DESIGN CRITERIA.
8. PROTECTIVE TRAFFIC BARRIER REQUIREMENTS SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION. ADDITIONAL HORIZONTAL CLEARANCE SHALL BE PROVIDED AS NECESSARY TO MEET MAINTENANCE ACCESS REQUIREMENTS PER THE CIVIL CHAPTER OF THE DESIGN CRITERIA.
9. SIDE CLEARANCE DESIGN CRITERIA SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.



**CLEARANCE OUTLINE FOR
NEW STRUCTURE OVER HST**

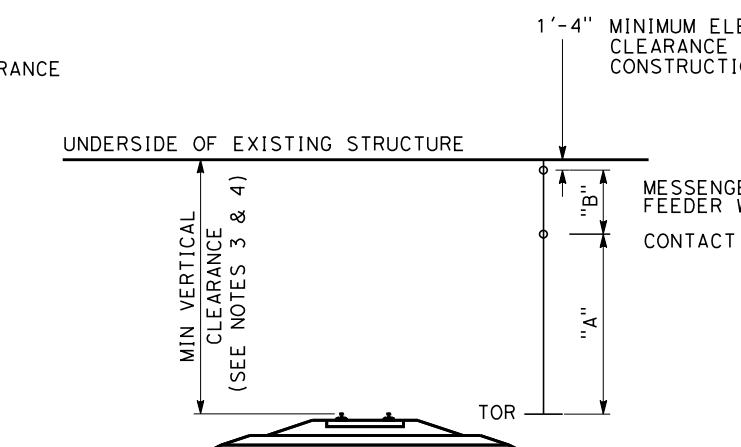


**CLEARANCE OUTLINE FOR
NEW HST STRUCTURE OVER ROADWAY**



NEW STRUCTURE OVER HST TRACKS

	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3"	27'-0"
SHARED USE TRACK	18'-9"	6'-11"	27'-0"



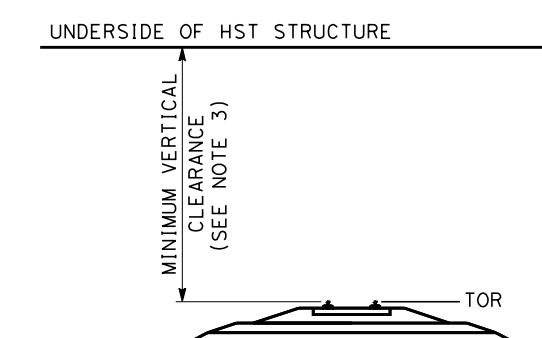
EXISTING STRUCTURE OVER HST TRACKS

	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3"	27'-0"
DEDICATED HST TRACK (V ≤ 125 MPH)	17'-5"	5'-3"	24'-0"*
SHARED USE TRACK	18'-9"	4'-0"	24'-6"**

* SEE NOTE 4
** PER CALTRAIN

MIN SIDE CLEARANCE
FREEWAY/EXPRESSWAY
OTHER
30'-0"
SEE NOTE 9

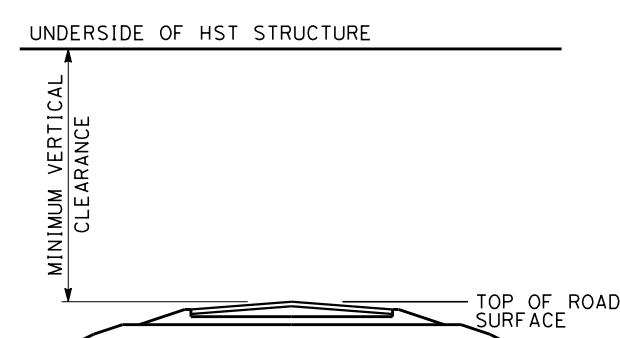
1'-4" MINIMUM ELECTRICAL
CLEARANCE AND
CONSTRUCTION TOLERANCE



NEW HST STRUCTURE OVER TRACK

MIN VERTICAL CLEARANCE
FREIGHT TRACKS
BNSF
UPRR
23'-4"
23'-0"

NON-FREIGHT TRACKS
METROLINK
CALTRAIN
24'-0"
24'-6"



NEW HST STRUCTURE OVER ROADWAY

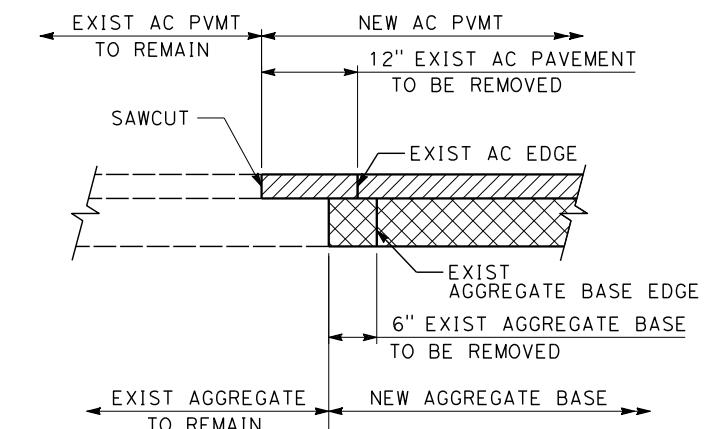
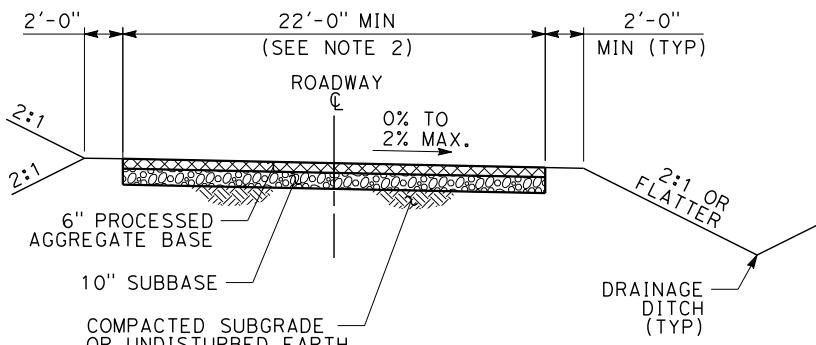
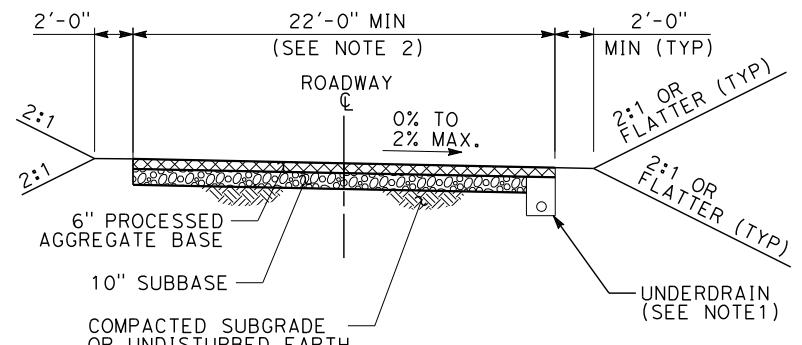
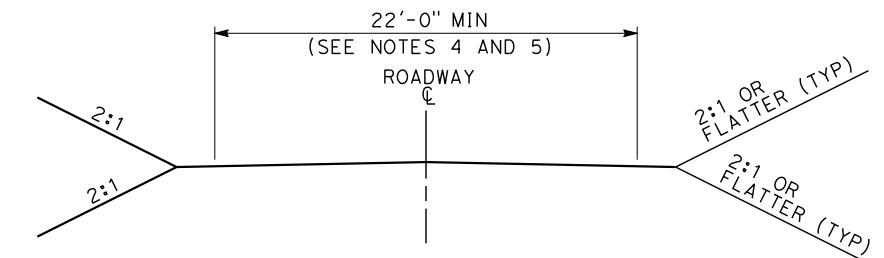
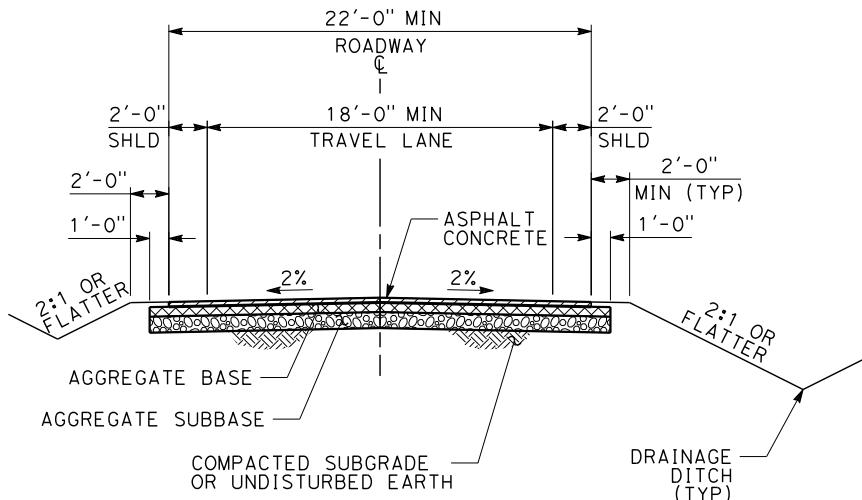
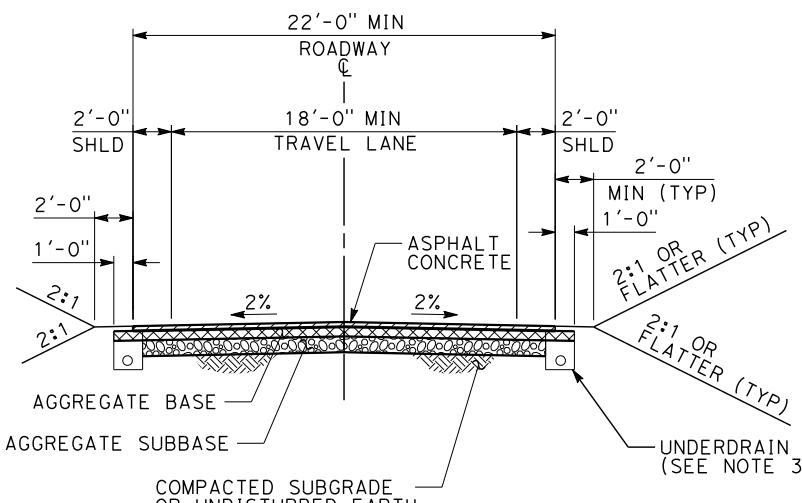
MIN VERTICAL CLEARANCE

FREEWAY/EXPRESSWAY
16'-6"
LOCAL ROADWAY
15'-0" *
EXTRA LEGAL LOAD NETWORK(ELLN)
20'-3"

* SEE NOTE 6

NOTES:

1. AUTHORITY ROADWAYS ARE REFERRED TO AS ACCESS ROADS AND SERVICE ROADS.
2. UNPAVED ROADWAYS CAN BE USED AS TEMPORARY ACCESS TO SITES.
3. REFER TO CALTRANS STANDARD PLANS FOR:
 - A) CURBS AND DRIVEWAYS (A87A)
 - B) UNDERDRAINS (D102)
4. IF FIRE HYDRANT IS LOCATED ON ROAD, MINIMUM ROADWAY WIDTH SHALL BE 26 FEET.
5. TWO-WAY SERVICE ROADS SHALL BE 24 FEET WIDE WITH NO SHOULDERS.
6. COMPACT SUBGRADE TO 95% COMPACTION.



SCALE: 1"=1'-0"

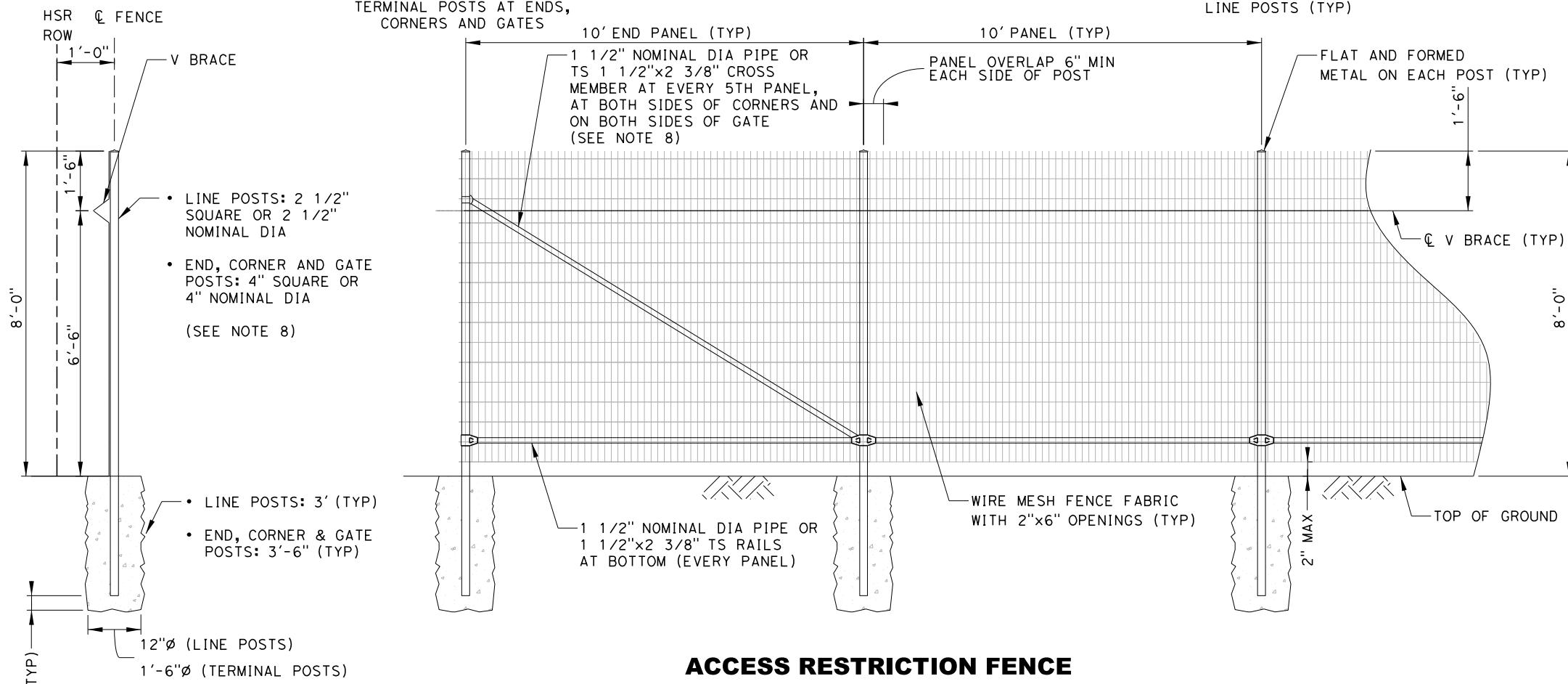


REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY S. MILITELLO	DRAWN BY V. HUANTE	CHECKED BY A. ABTAHI	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

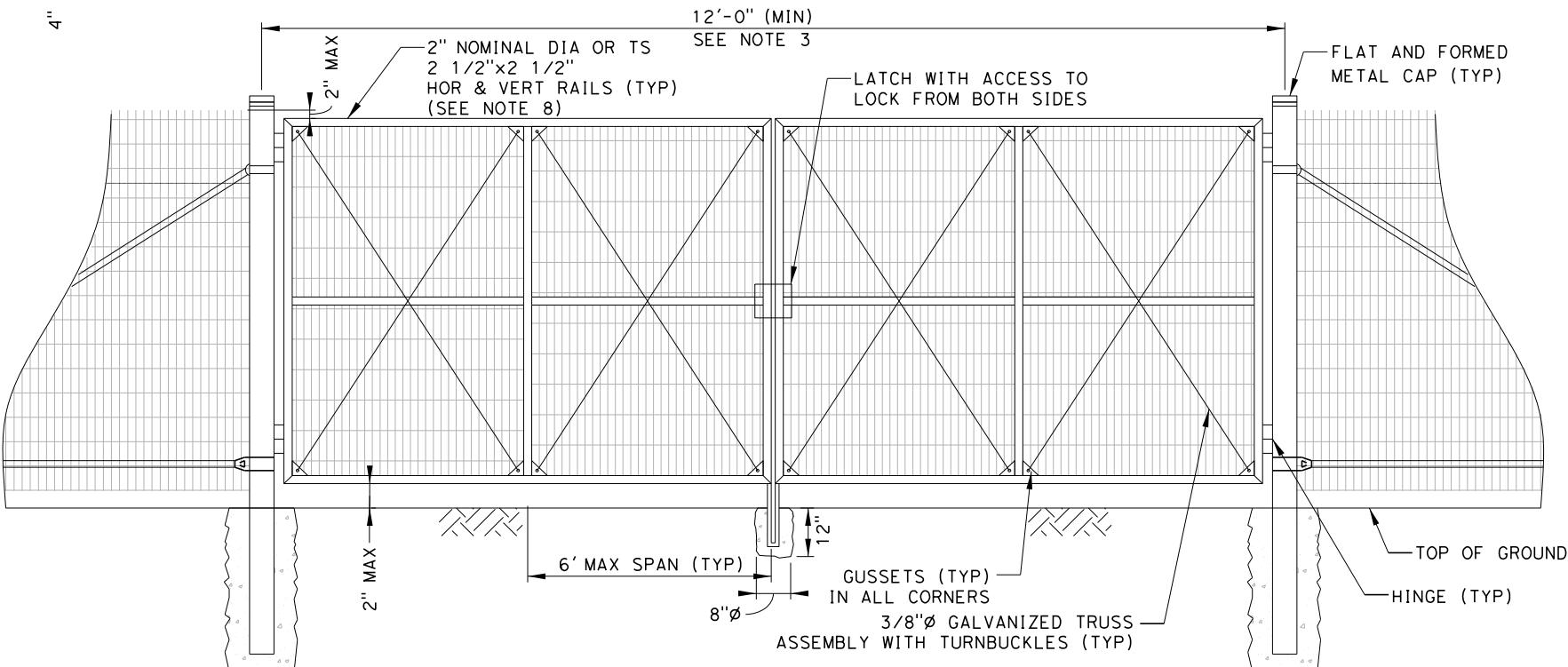
**PARSONS
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AUTHORITY ROADWAYS

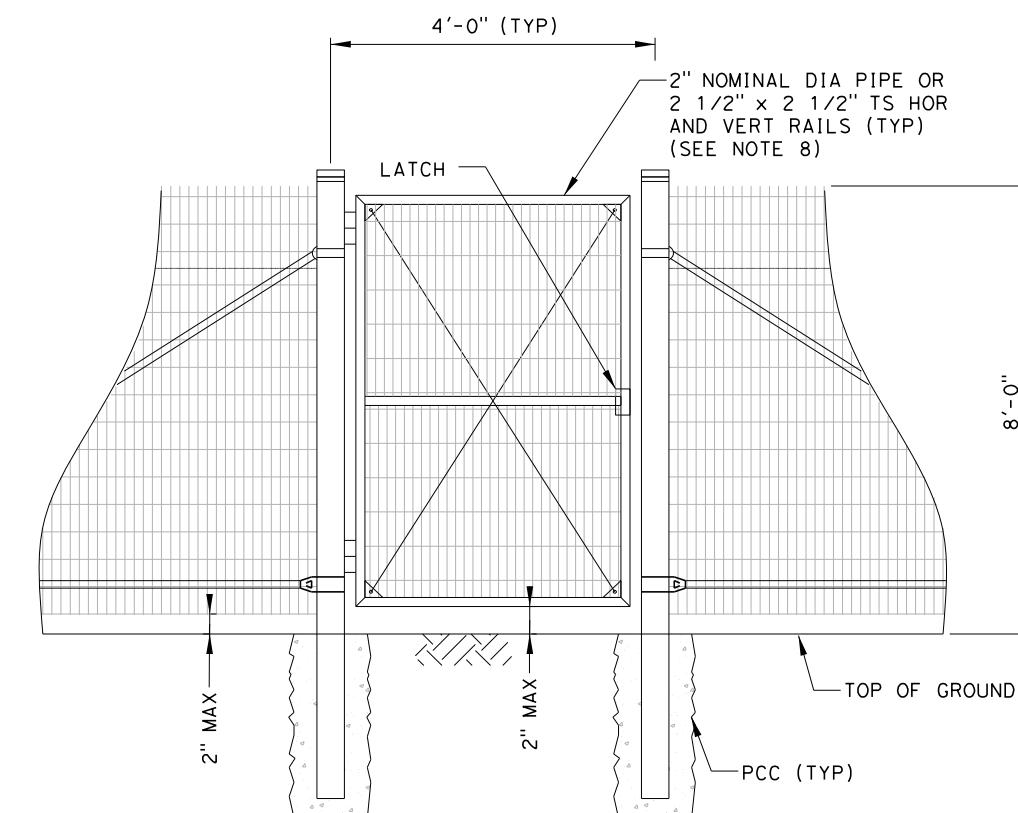
CONTRACT NO.	
DRAWING NO.	DD-CV-905
SCALE	AS SHOWN
SHEET NO.	



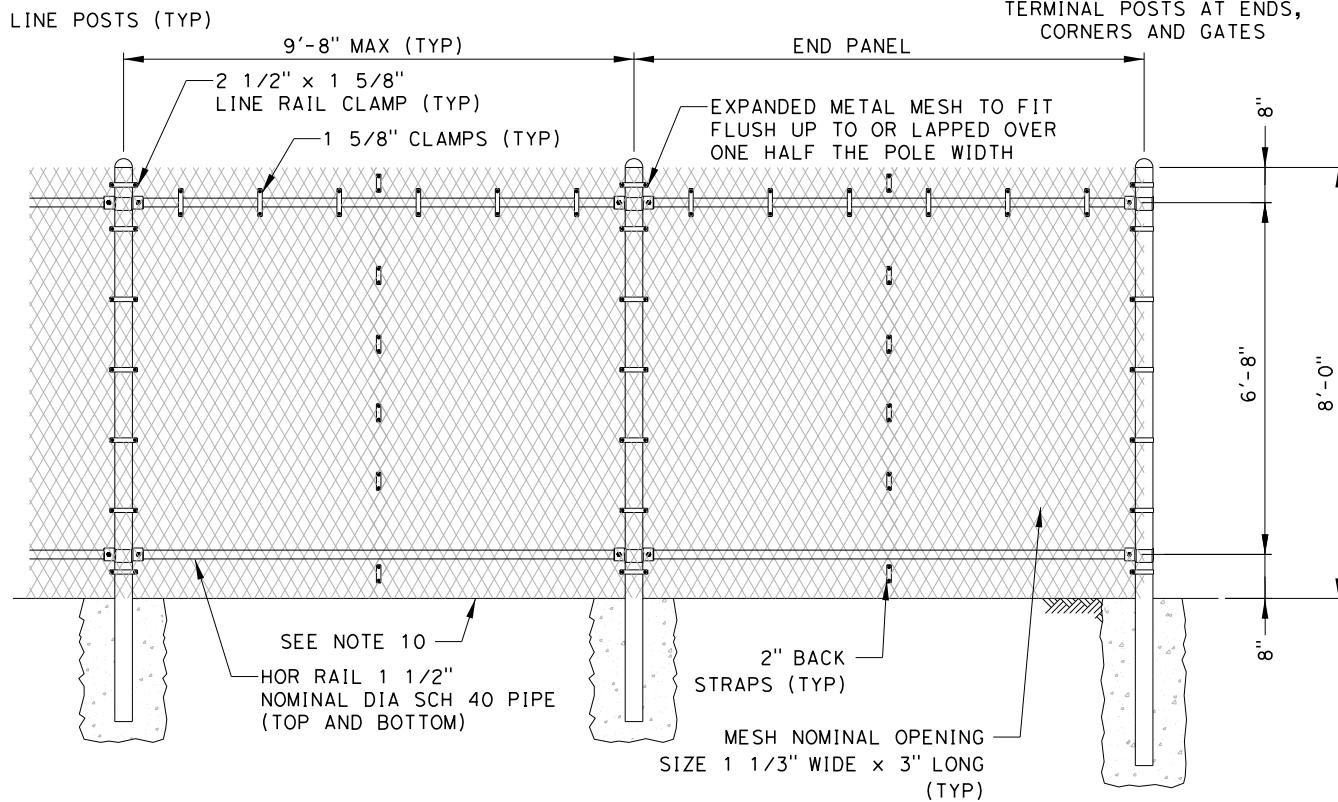
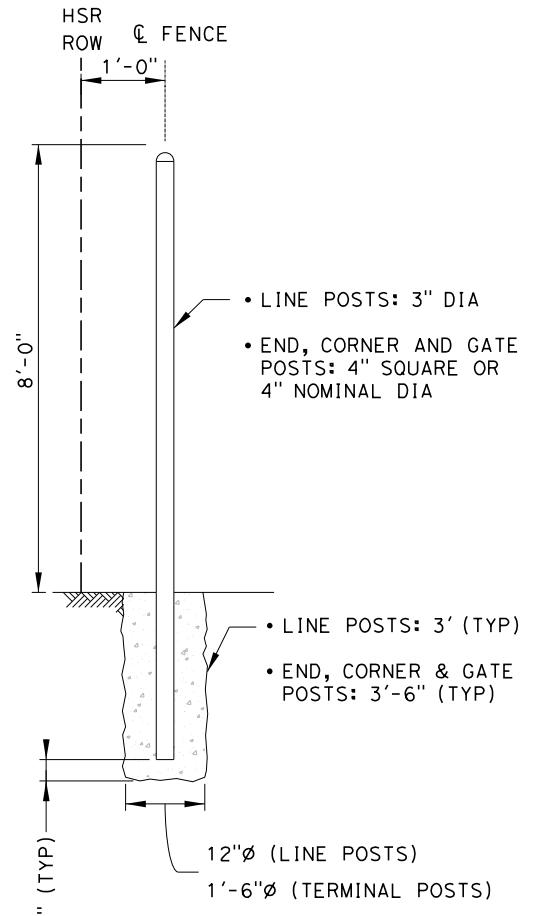
ACCESS RESTRICTION FENCE



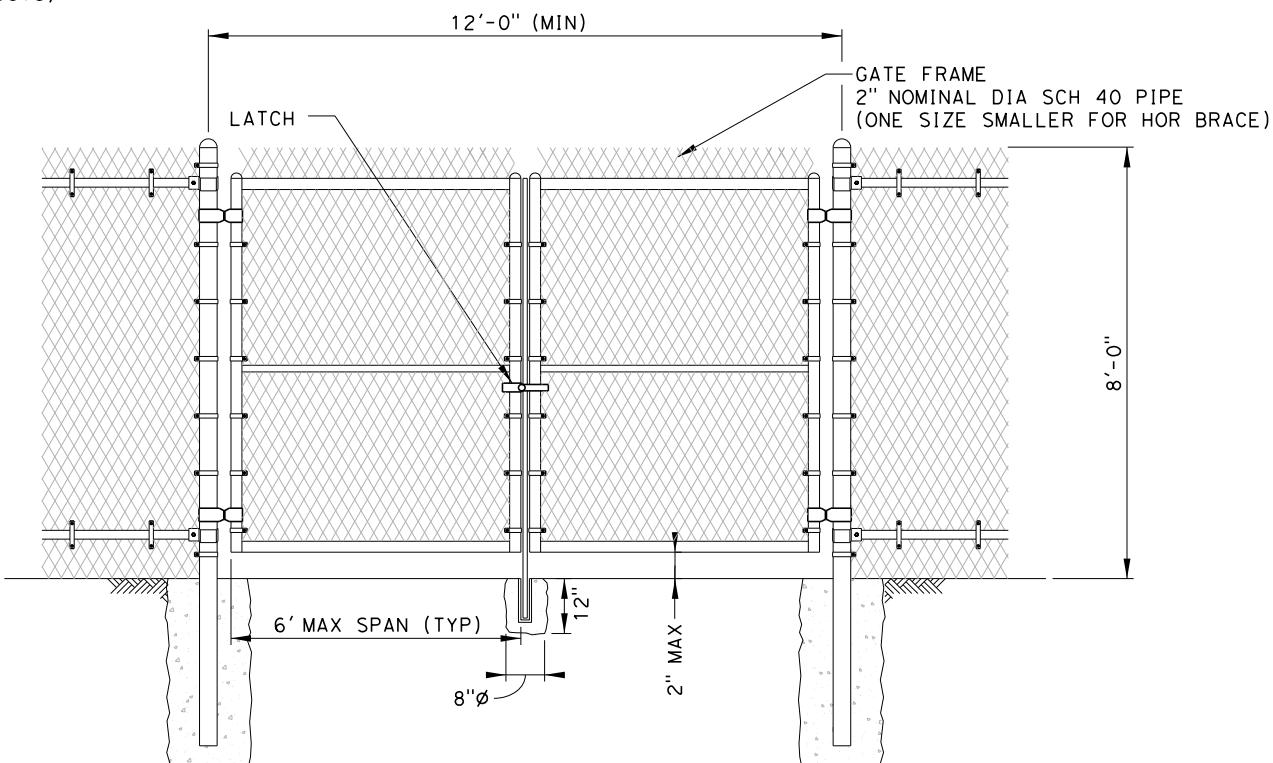
VEHICLE ACCESS GATE ALONG AR FENCE



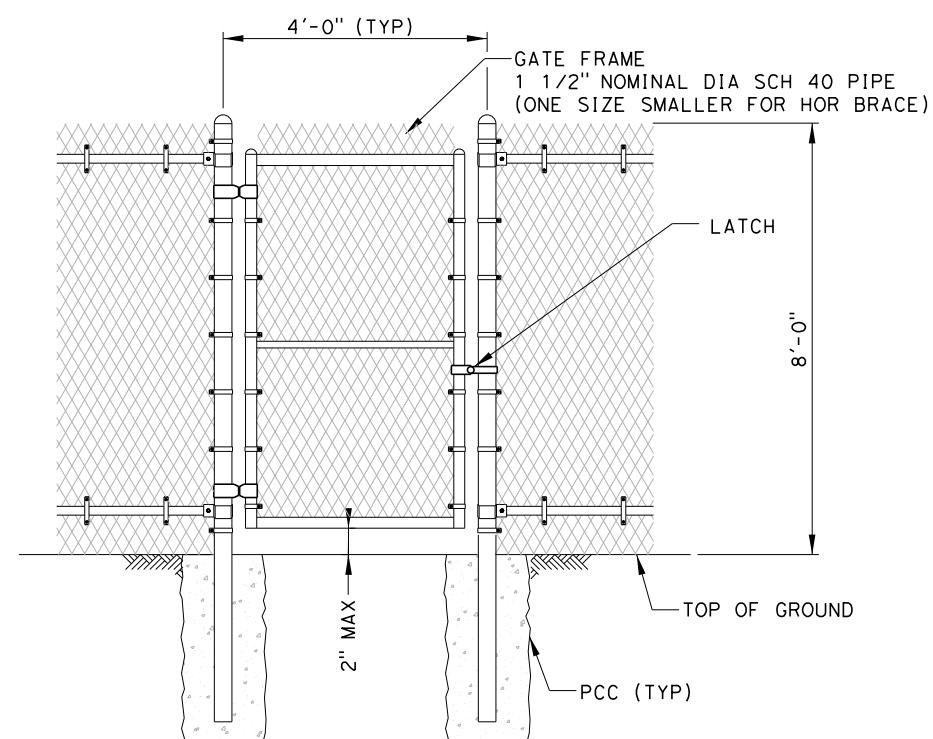
PEDESTRIAN ACCESS GATE ALONG AR FENCE



ACCESS RESTRICTION FENCE



VEHICLE ACCESS GATE ALONG AR FENCE



PEDESTRIAN ACCESS GATE ALONG AR FENCE

REV	DATE	BY	CHK	APP	DESCRIPTION
	09/18/2015				

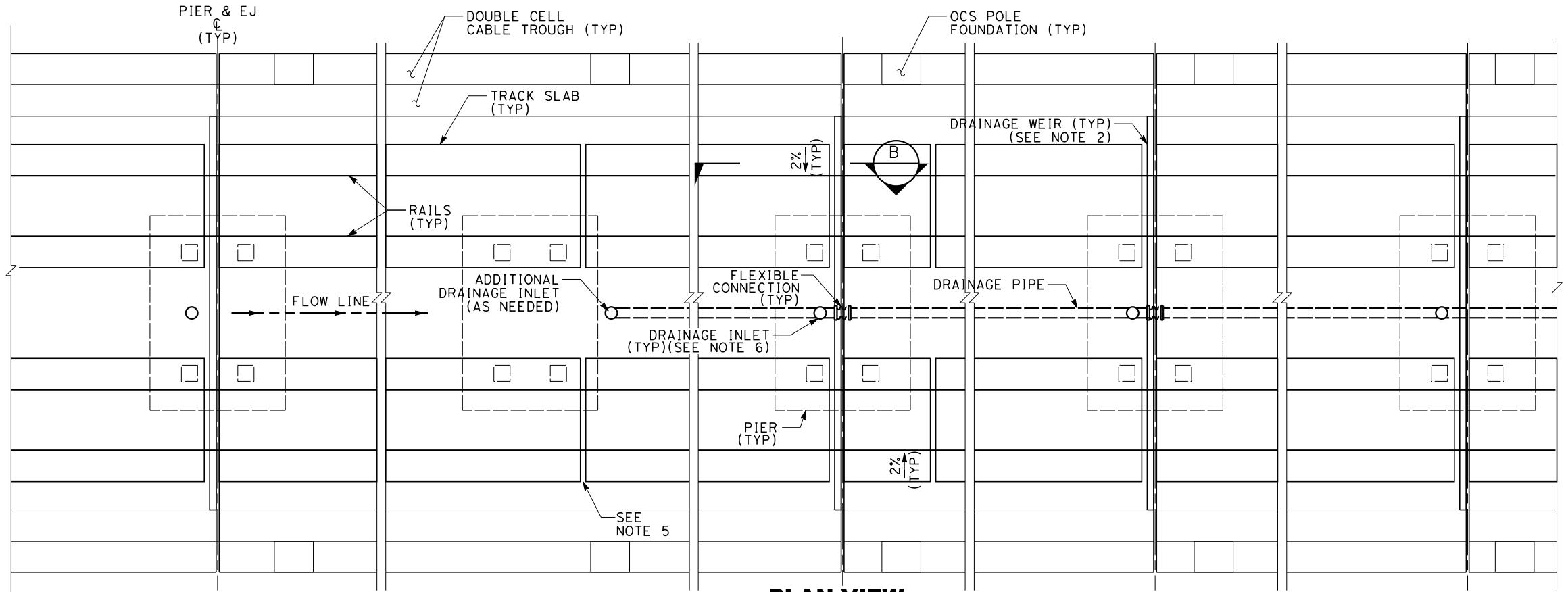
DESIGNED BY A. ABTAHI	
DRAWN BY V. LAVERDE	
CHECKED BY S. MILITELLO	
IN CHARGE G. LUSHEROVICH	
DATE 09/18/2015	

**PARSONS
BRINCKERHOFF**

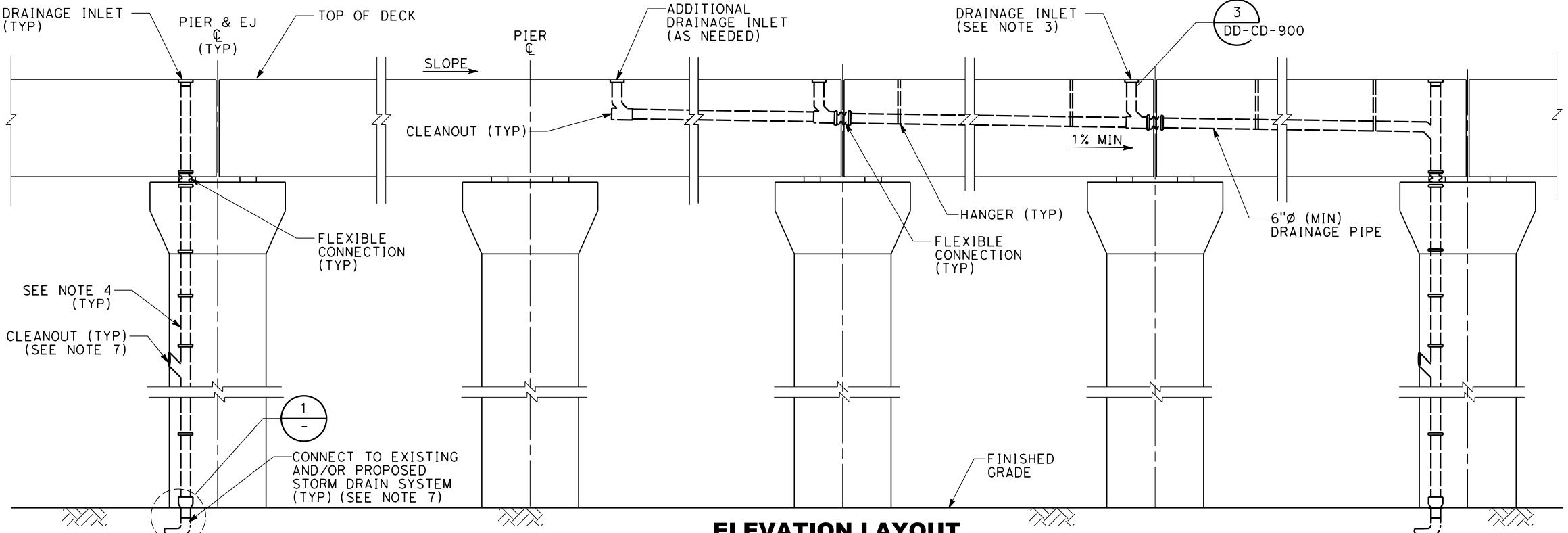


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**
ACCESS RESTRICTION FENCE AND GATE DETAILS
HIGH SECURITY AREA
EXPANDED METAL MESH

CONTRACT NO.	
DRAWING NO.	DD-CV-921
SCALE	NO SCALE
SHEET NO.	



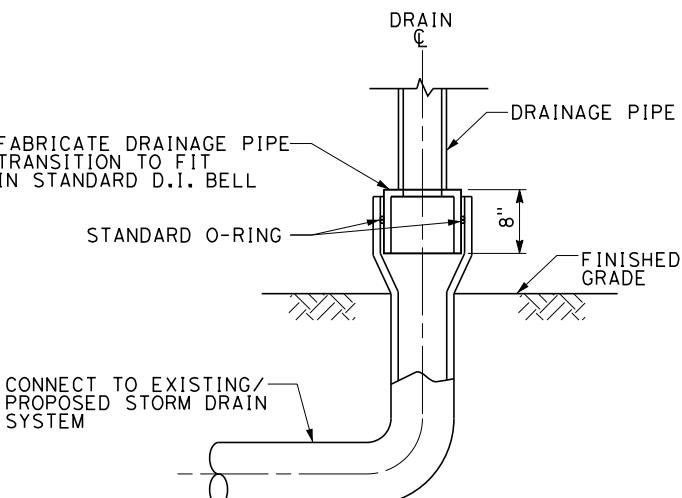
PLAN VIEW



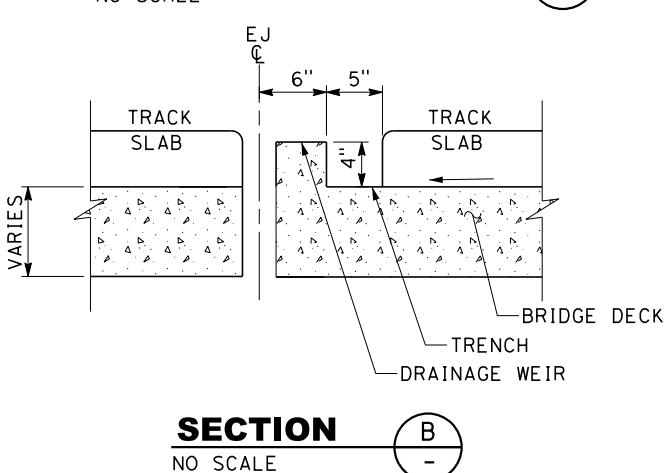
ELEVATION LAYOUT

NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. WEIR AND INLET SHALL BE PROVIDED UPSTREAM OF EVERY EXPANSION JOINT.
3. IF DOWNSPOUT IS NOT FEASIBLE AT EXPANSION JOINT, COLUMN CONNECTED STORM WATER MAY BE CONVEYED THROUGH DRAINAGE PIPE, USING FLEXIBLE CONNECTIONS AT EXPANSION JOINTS, UNTIL DOWNSPOUT CAN BE CONNECTED TO EXISTING/ PROPOSED STORM DRAIN SYSTEM.
4. PROVIDE MINIMUM 1'-6" GAP BETWEEN PVC PIPE AND FACE OF COLUMN WALL.
5. PROVIDE A 5-INCH WIDE GAP IN TRACK SLAB, 20'-0" ON CENTER AND ONE JUST UPSTREAM OF THE WEIR, SEE DETAIL.
6. REFER TO DRAINAGE DRAWING "AERIAL STRUCTURE BRIDGE DECK DRAINAGE INLET DETAIL" FOR DRAINAGE INLET DETAIL.
7. CLEANOUTS AND PIPE PENETRATIONS FROM THE COLUMNS SHALL FOLLOW THE "COLUMN REINFORCEMENT AT DRAIN OUTLET" OF CALTRANS BRIDGE DESIGN AID 17-1, DECK DRAINAGE DESIGN.



TRANSITION DETAIL



SECTION

**PARSONS
BRINCKERHOFF**



CALIFORNIA HIGH-SPEED RAIL AUTHORITY

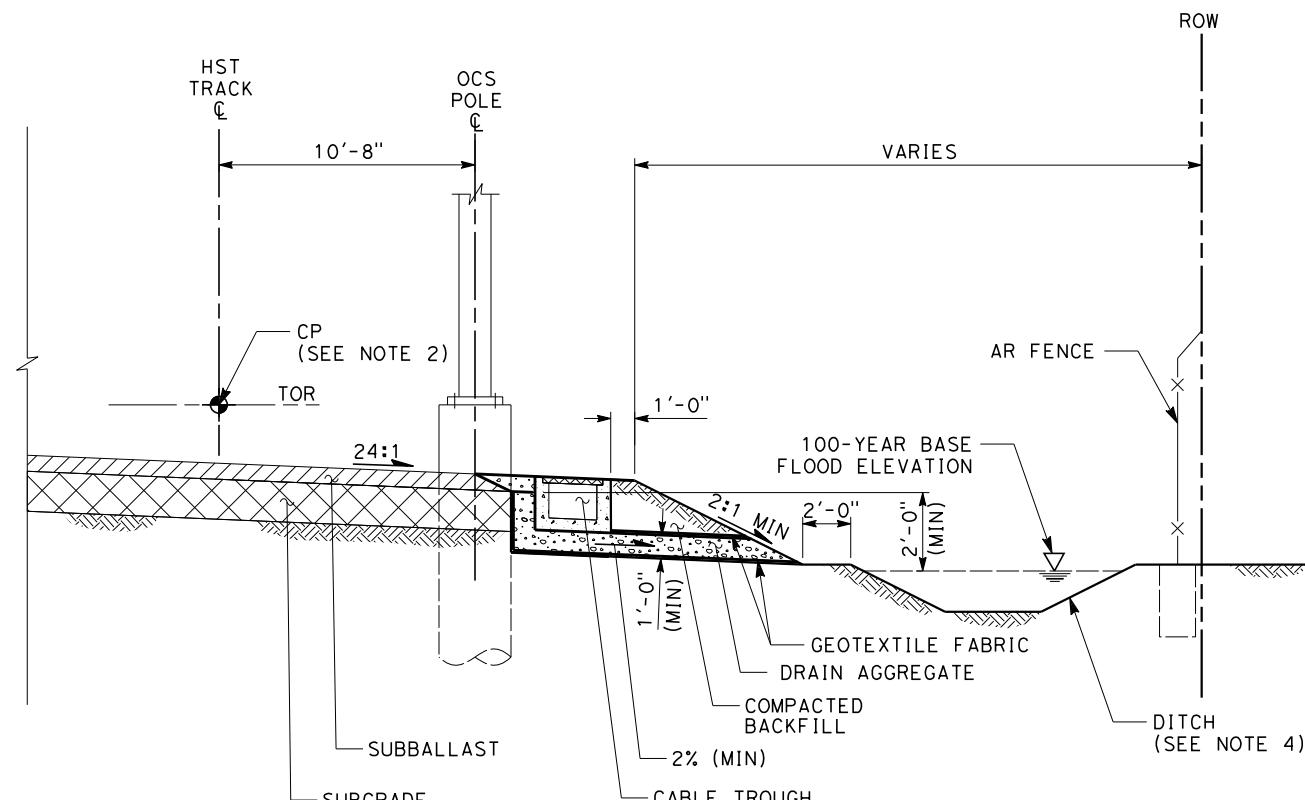
CALIFORNIA HIGH-SPEED TRAIN PROJECT

DRAINAGE DIRECTIVE

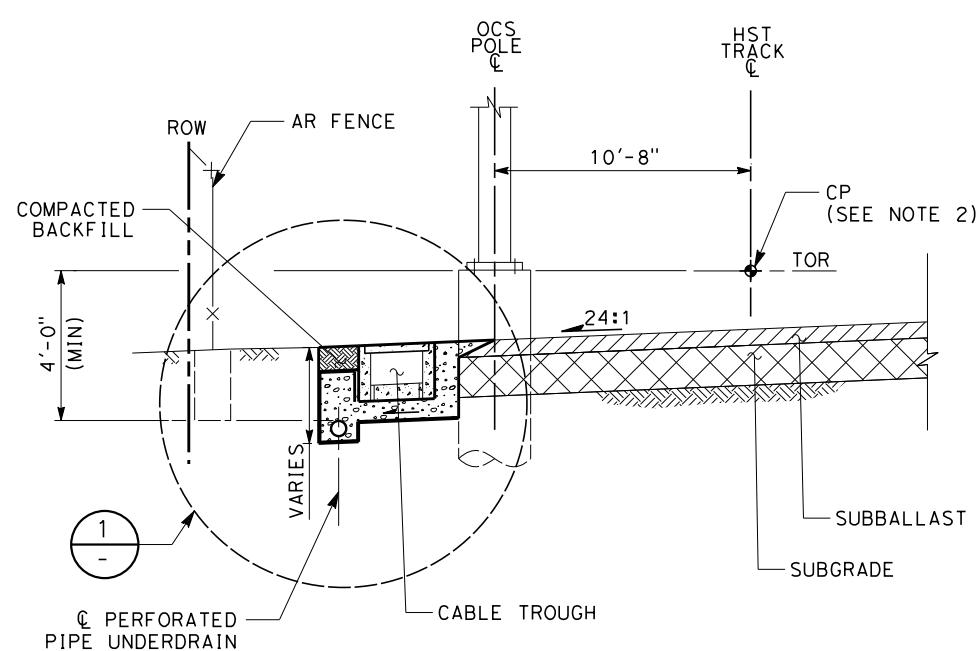
NON-BALLASTED AERIAL STRUCTURE DECK DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO.
DD-CD-001
SCALE
NO SCALE
SHEET NO.

5/22/2014 5:05:36 PM CAHSRH-Tbl C:\projectwise\pb\projectwise\laver-dev\dim\22168.ud CD-003.dgn
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TYPICAL SECTION



TYPICAL SECTION

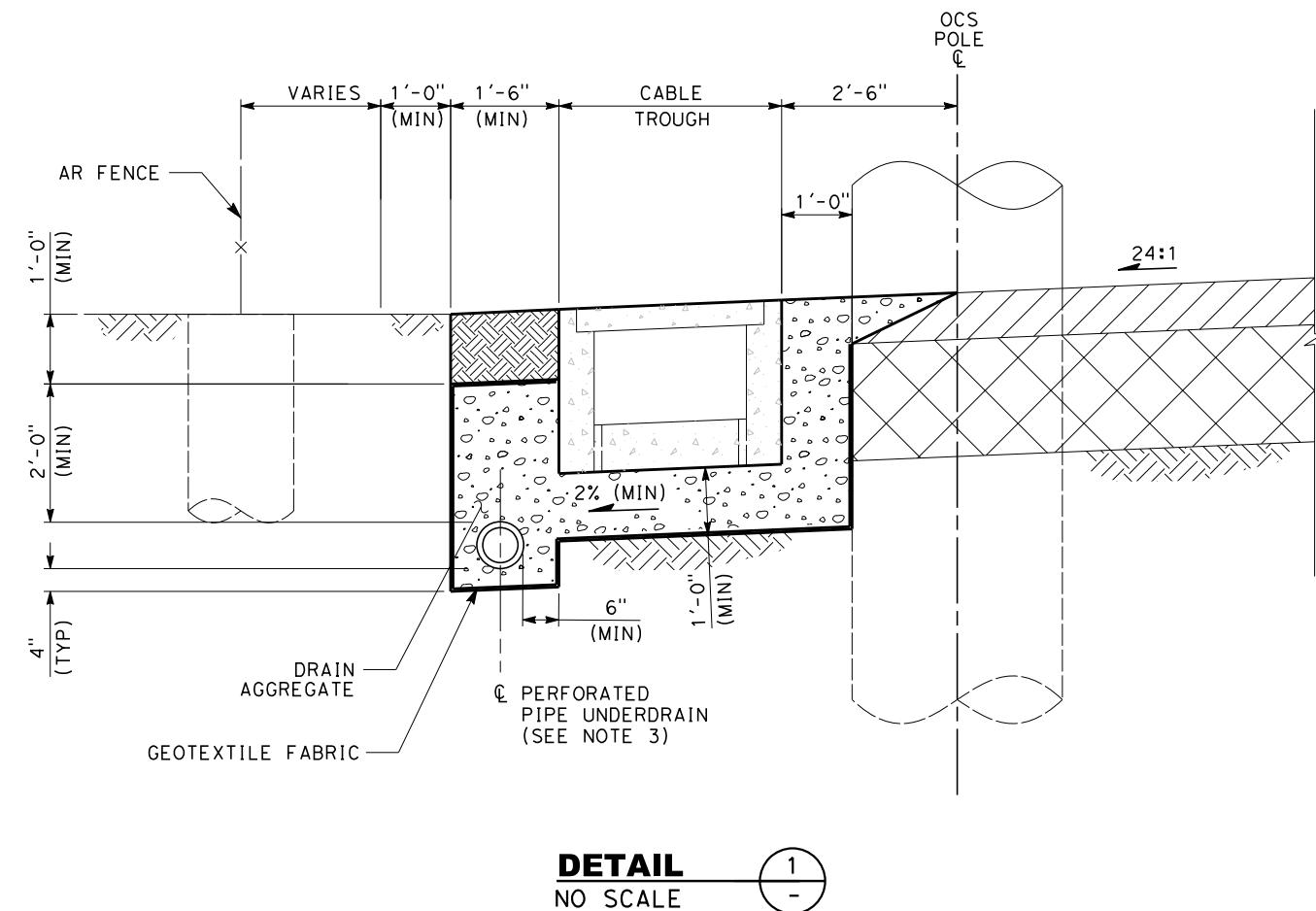
AT GRADE TRACK CLOSED DRAINAGE SYSTEM



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

NOTES:

1. TRACK AND SYSTEMS ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CONTROL POINT (CP) IS THE INTERSECTION OF THE CENTERLINE OF TRACK AND THE TOP OF THE RAIL, FOR SUPERELEVATED TRACK SECTIONS THE CP IS THE INTERSECTION OF THE CENTERLINE OF THE TRACK AND THE TOP OF THE LOW RAIL.
3. TRACK DRAINAGE SYSTEM SHALL BE CONNECTED AND DISCHARGE TO THE LOCAL STORM DRAIN SYSTEM.
4. DITCH SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
DEPTH OF DITCH = 1' MINIMUM
SIDE SLOPE =
2:1 MAXIMUM FOR CONCRETE LINED DITCH AND
3:1 MAXIMUM FOR GRASS LINED DITCH
WIDTH OF FLAT BOTTOM = 4' MINIMUM



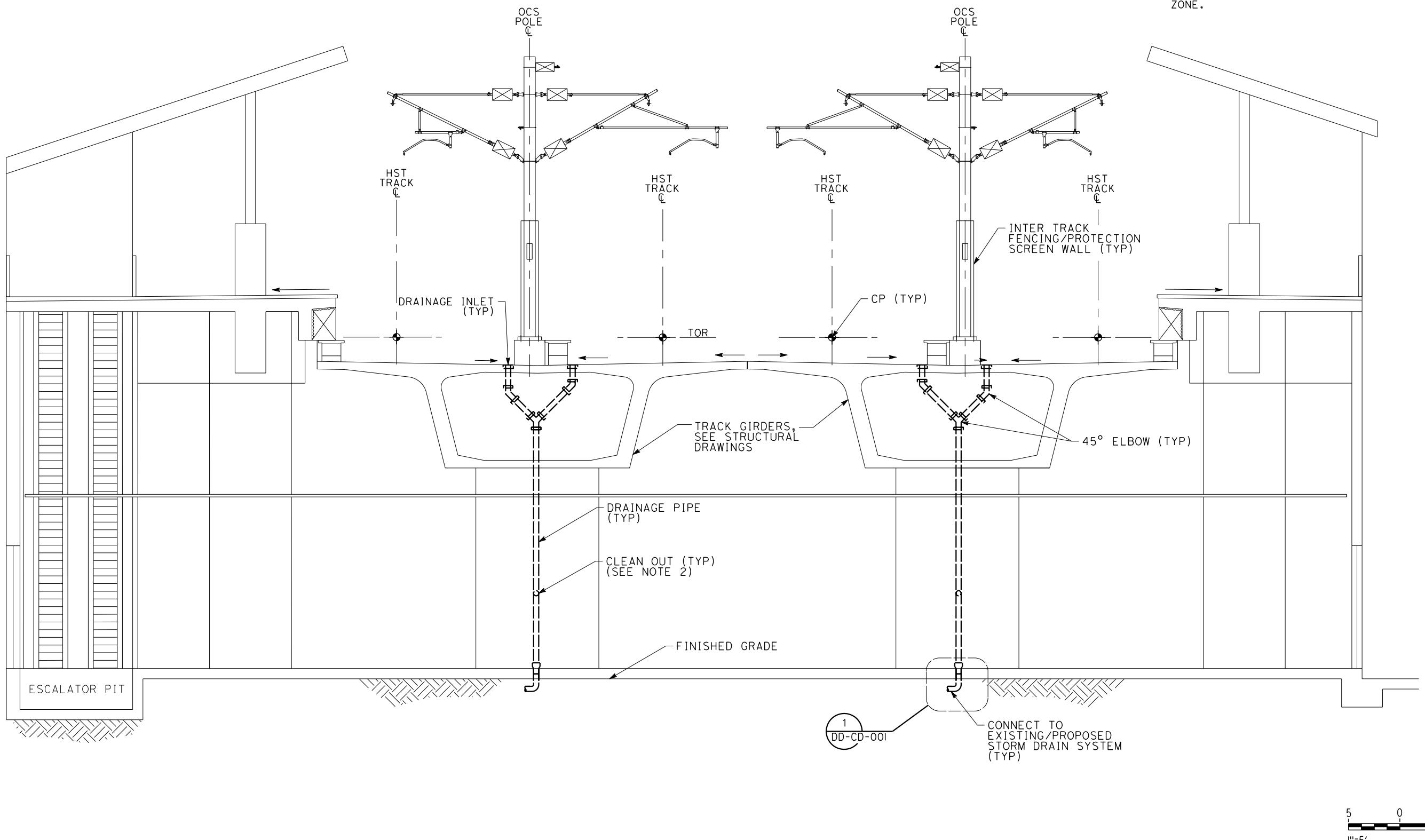
CALIFORNIA HIGH-SPEED TRAIN PROJECT DRAINAGE DIRECTIVE

AT-GRADE TRACK DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO. DD-CD-003
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. CLEANOUTS AND PIPE PENETRATIONS FROM THE COLUMNS SHALL BE OUTSIDE OF THE PLASTIC HINGE ZONE.



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY K. SISTLA DRAWN BY V. HUANTE CHECKED BY A. ABTAHI IN CHARGE G. LUSHEROVICH DATE 01/24/2014

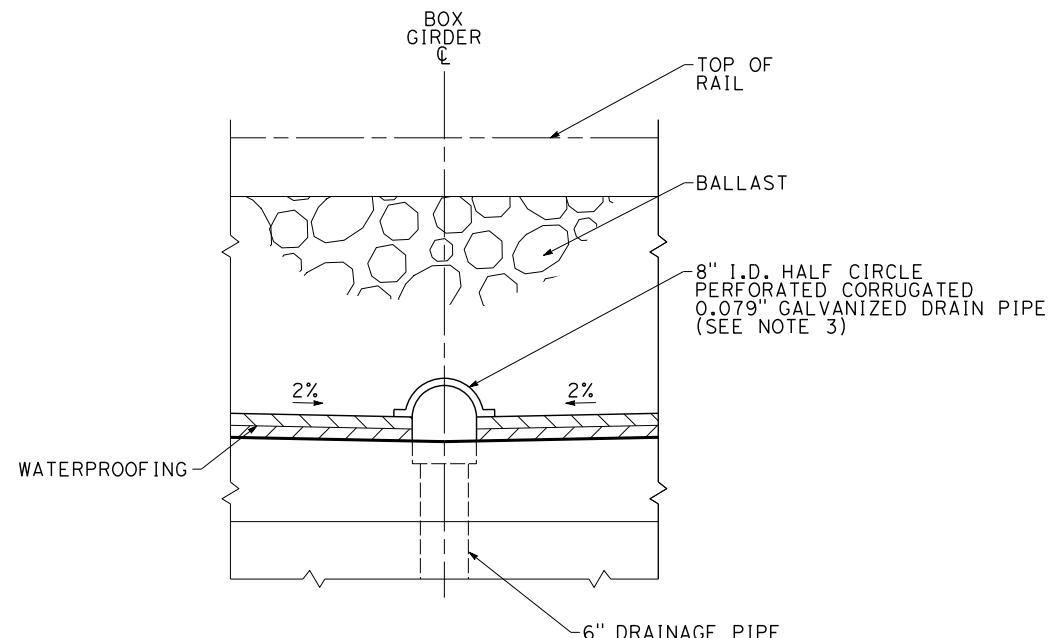
**PARSONS
BRINCKERHOFF**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**
**ELEVATED STATION PLATFORM
DRAINAGE SYSTEM**

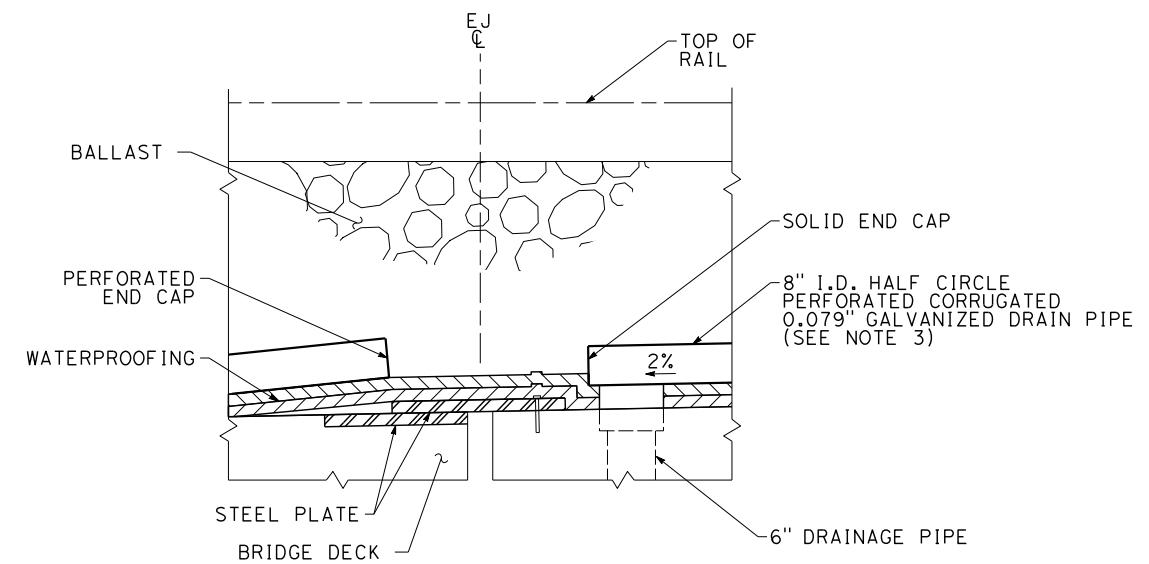
CONTRACT NO.
DRAWING NO. DD-CD-010
SCALE AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR DRAINAGE SYSTEM DETAILS SEE DD-CD-001.
3. THE 8" HALF CIRCLE PERFORATED PIPE SHALL BE INSTALLED ALONG THE ENTIRE INVERTED CROWN OF THE BRIDGE DECK, EXCEPT AT THE EXPANSION JOINT.



DRAIN DETAIL
ON CONCRETE DECK



EXPANSION JOINT DETAIL
ON BALLASTED AERIAL STRUCTURE

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. HUANTE CHECKED BY H. NGUYEN IN CHARGE G. LUSHEROVICH DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



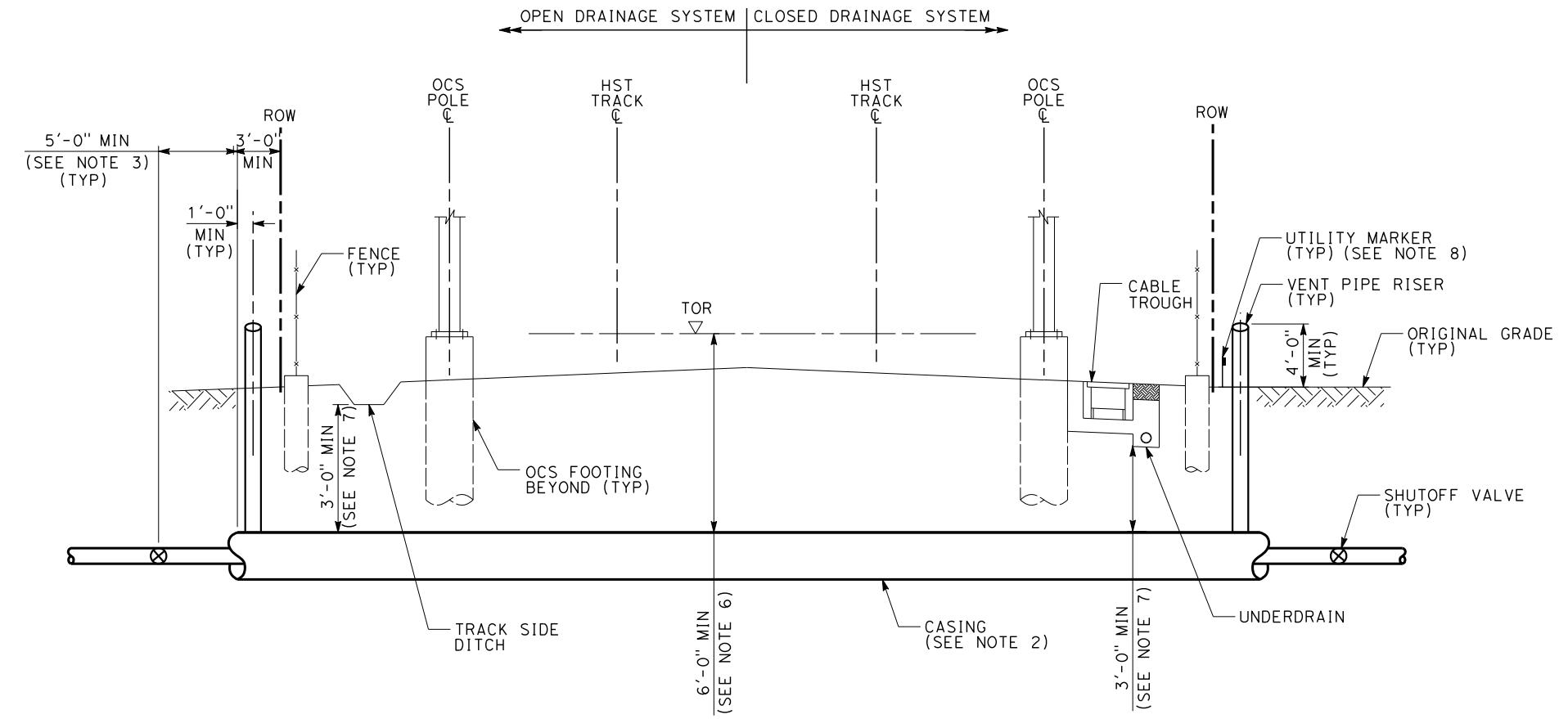
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

BALLASTED AERIAL STRUCTURE
DECK DRAINAGE SYSTEM DETAILS

CONTRACT NO.
13259
DRAWING NO.
DD-CD-901
SCALE
NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
3. SHUTOFF VALVE MUST BE ACCESSIBLE FROM OUTSIDE THE RIGHT OF WAY. IT MAY NOT BE REQUIRED ON BOTH SIDES.
4. THE CASING SHALL CONTINUE 3'-0" BEYOND THE RIGHT OF WAY.
5. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.
6. MINIMUM CLEARANCE FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 10'-6" BELOW TOP OF RAIL.
7. MINIMUM CLEARANCE FOR UNDERGROUND WIRE LINE CROSSING, OVER 750 VOLTS, SHALL BE 4'-0" AND FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 6'-0" BELOW DRAINAGE FACILITIES.
8. UTILITY MARKER TO INDICATE LOCATION OF UTILITY CROSSING AT RIGHT-OF-WAY.



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. HUANTE CHECKED BY H. NGUYEN IN CHARGE G. LUSHEROVICH DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



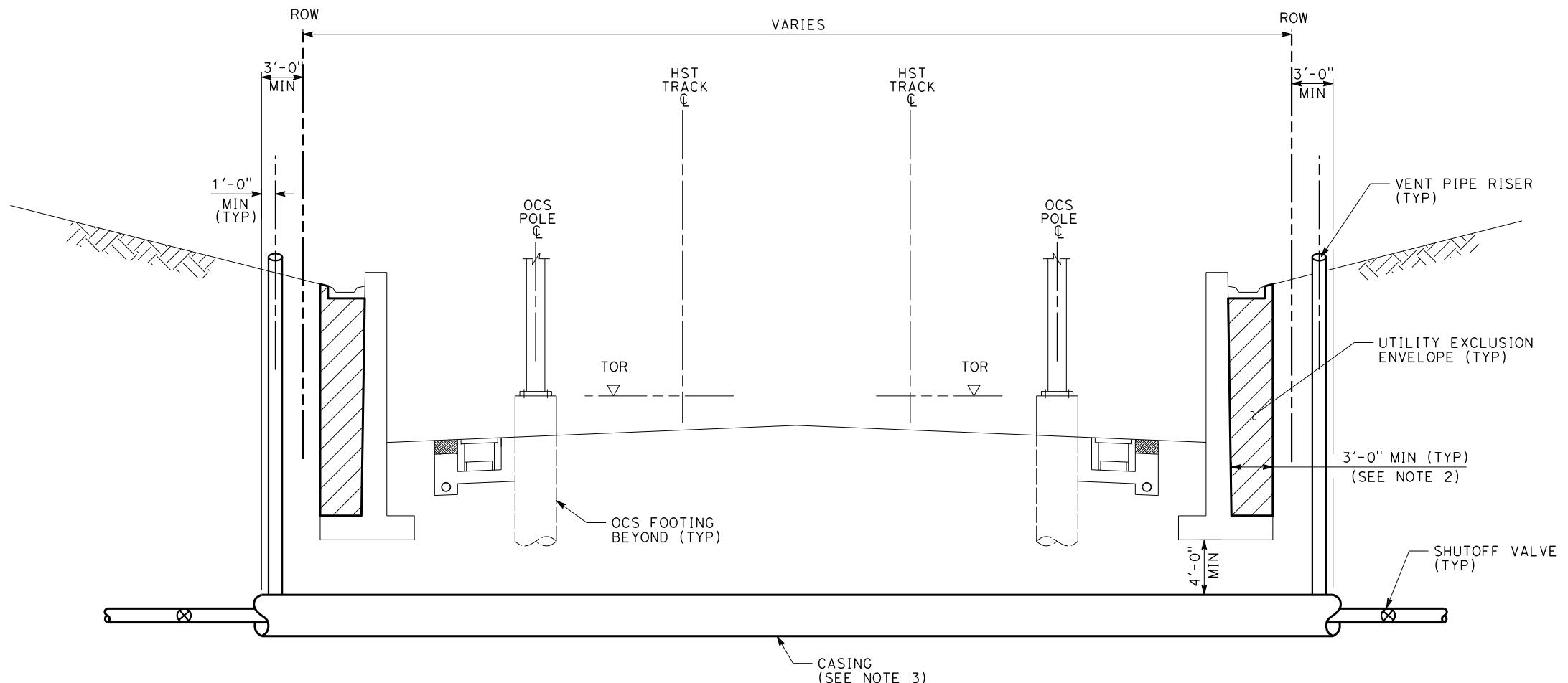
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE**

UTILITY CROSSING CLEARANCES
AT GRADE

CONTRACT NO.
DRAWING NO. DD-UT-001
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. NO UTILITIES ABOVE THE WALL FOOTINGS.
3. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
4. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. HUANTE CHECKED BY H. NGUYEN IN CHARGE G. LUSHEROVICH DATE 01/24/2014

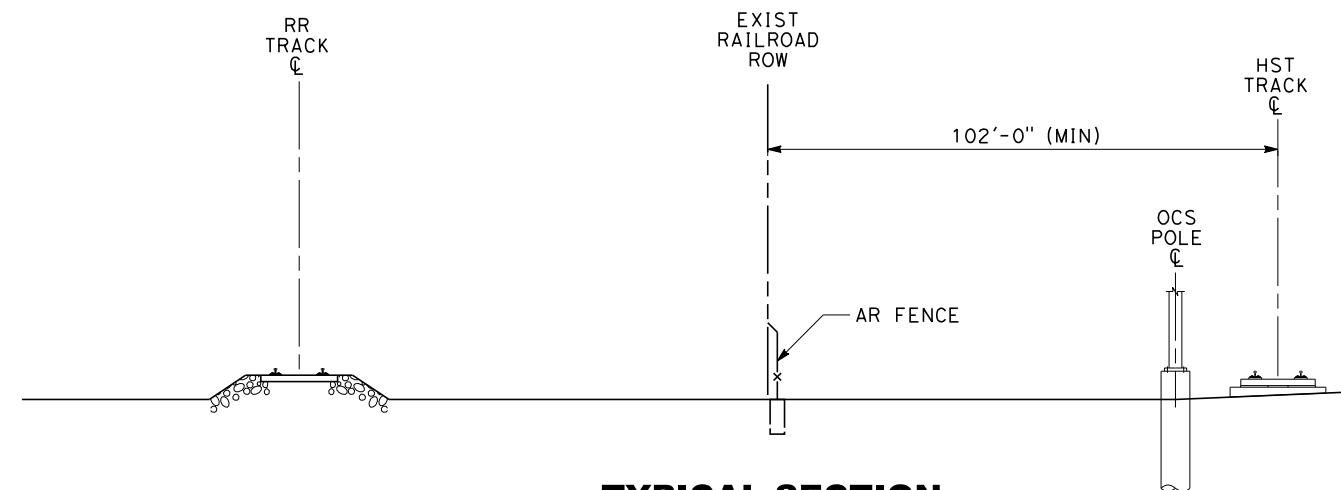
**PARSONS
BRINCKERHOFF**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE**
UTILITIES CROSSING CLEARANCES
RETAINED CUT TRENCH

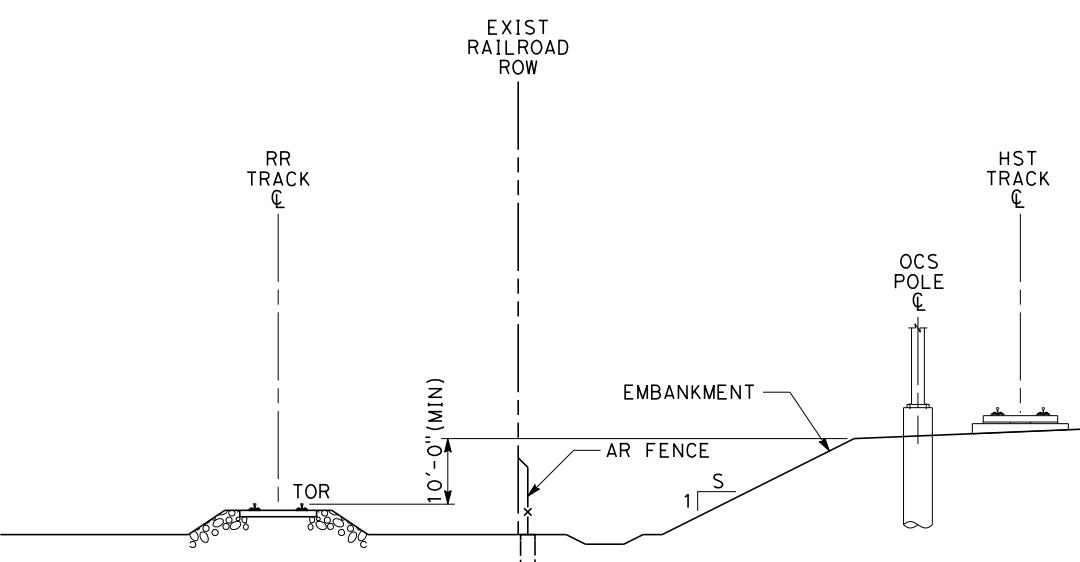
CONTRACT NO.
DRAWING NO. DD-UT-002
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. AR FENCE AND ITS FOUNDATION SHALL BE INSTALLED INSIDE AUTHORITY RIGHT-OF-WAY.
3. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.
4. SUBJECT TO FINAL APPROVAL BY CONVENTIONAL RAILROAD OPERATOR.



TYPICAL SECTION
102' LATERAL SEPARATION
NO INTRUSION PROTECTION REQUIRED
(SEE NOTE 4)



TYPICAL SECTION
MINIMUM 10' HIGH HST EMBANKMENT
NO INTRUSION PROTECTION REQUIRED
(SEE NOTE 4)

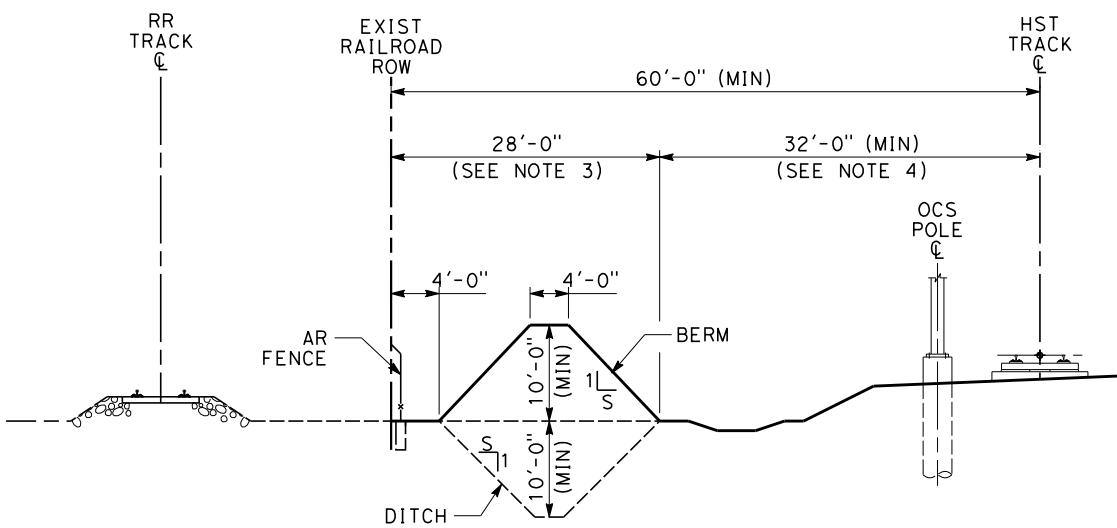
DESIGNED BY A. ABTAHI	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CONTRACT NO.
DRAWN BY V. HUANTE			DRAWING NO.
CHECKED BY H. NGUYEN			DD-IP-100
IN CHARGE G. LUSHEROVICH			SCALE
DATE 08/24/2015			NO SCALE
REV DATE BY CHK APP	DESCRIPTION		SHEET NO.

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

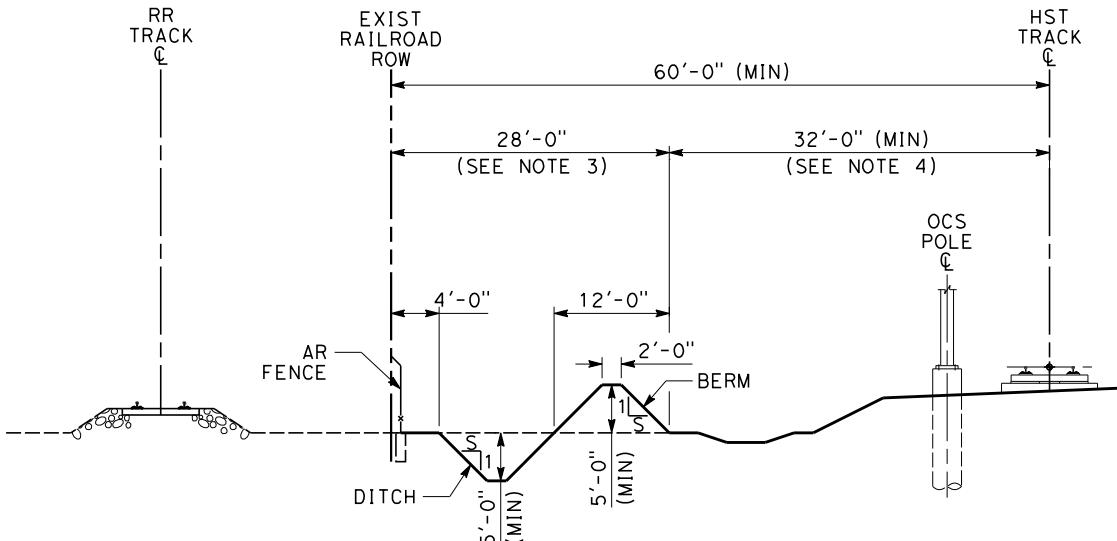
RAILROAD ADJACENT TO HST
AT-GRADE WITHOUT INTRUSION PROTECTION

NOTES:

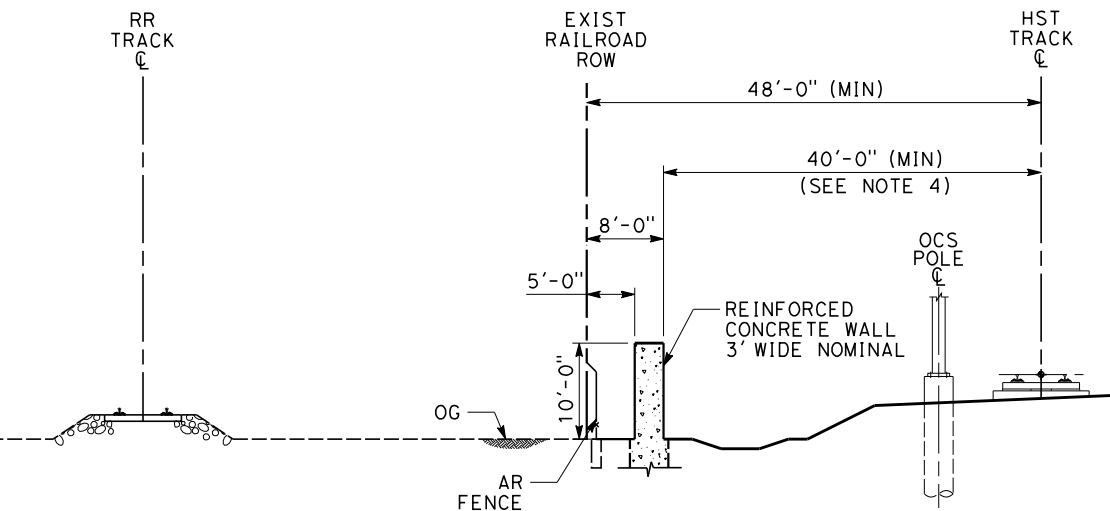
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SIDE SLOPES (S:1) DETERMINED THROUGH SLOPE STABILITY ANALYSIS. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.
3. MINIMUM DISTANCE IS BASED ON S=1.
4. MINIMUM DISTANCE CONSIDERS A MINIMUM OF 3'-6" HIGH EMBANKMENT, INCLUSIVE OF SUBBALLAST.
5. BERM MATERIAL AND COMPACTION SHALL BE SIMILAR TO EMBANKMENT.
6. SUBJECT TO FINAL APPROVAL BY CONVENTIONAL RAILROAD OPERATOR.



TYPICAL SECTION
EARTHEN BERM OR DITCH
(SEE NOTE 6)



TYPICAL SECTION
EARTHEN BERM AND DITCH
(SEE NOTE 6)



TYPICAL SECTION
CONCRETE WALL BARRIER
(SEE NOTE 6)

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. HUANTE CHECKED BY H. NGUYEN IN CHARGE G. LUSHEROVICH DATE 09/18/2015

**PARSONS
BRINCKERHOFF**



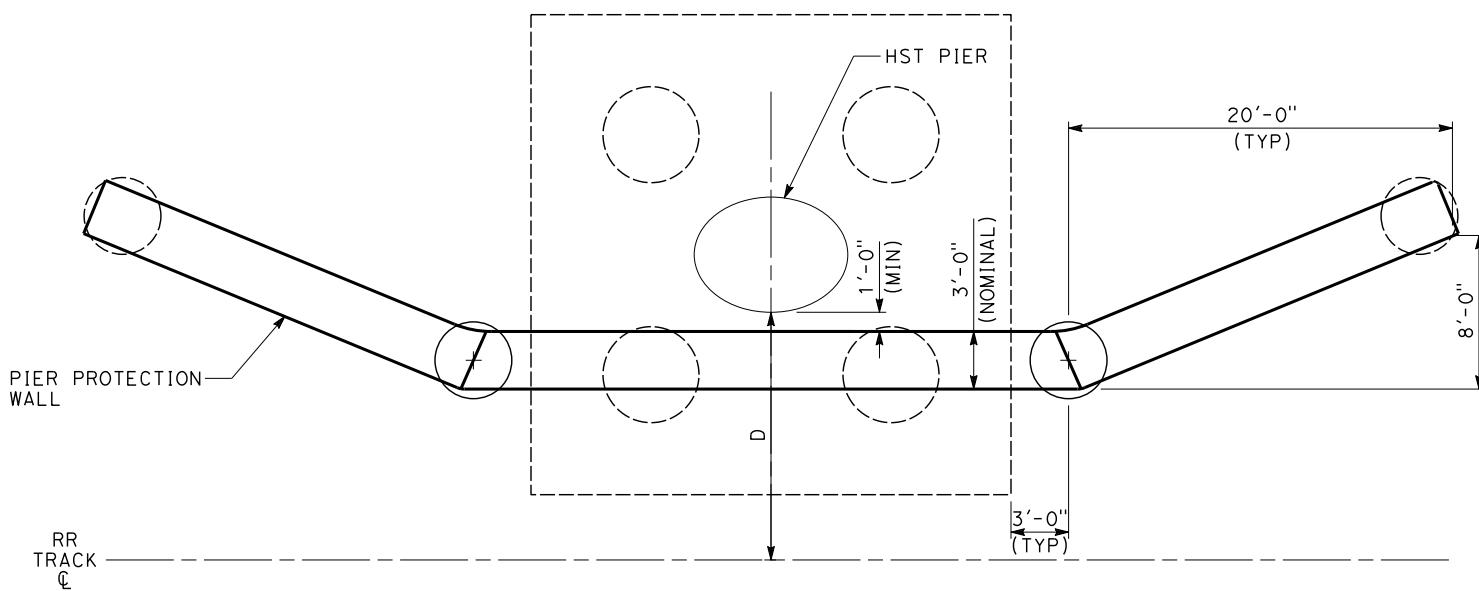
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

RAILROAD ADJACENT TO HST
AT-GRADE WITH INTRUSION PROTECTION

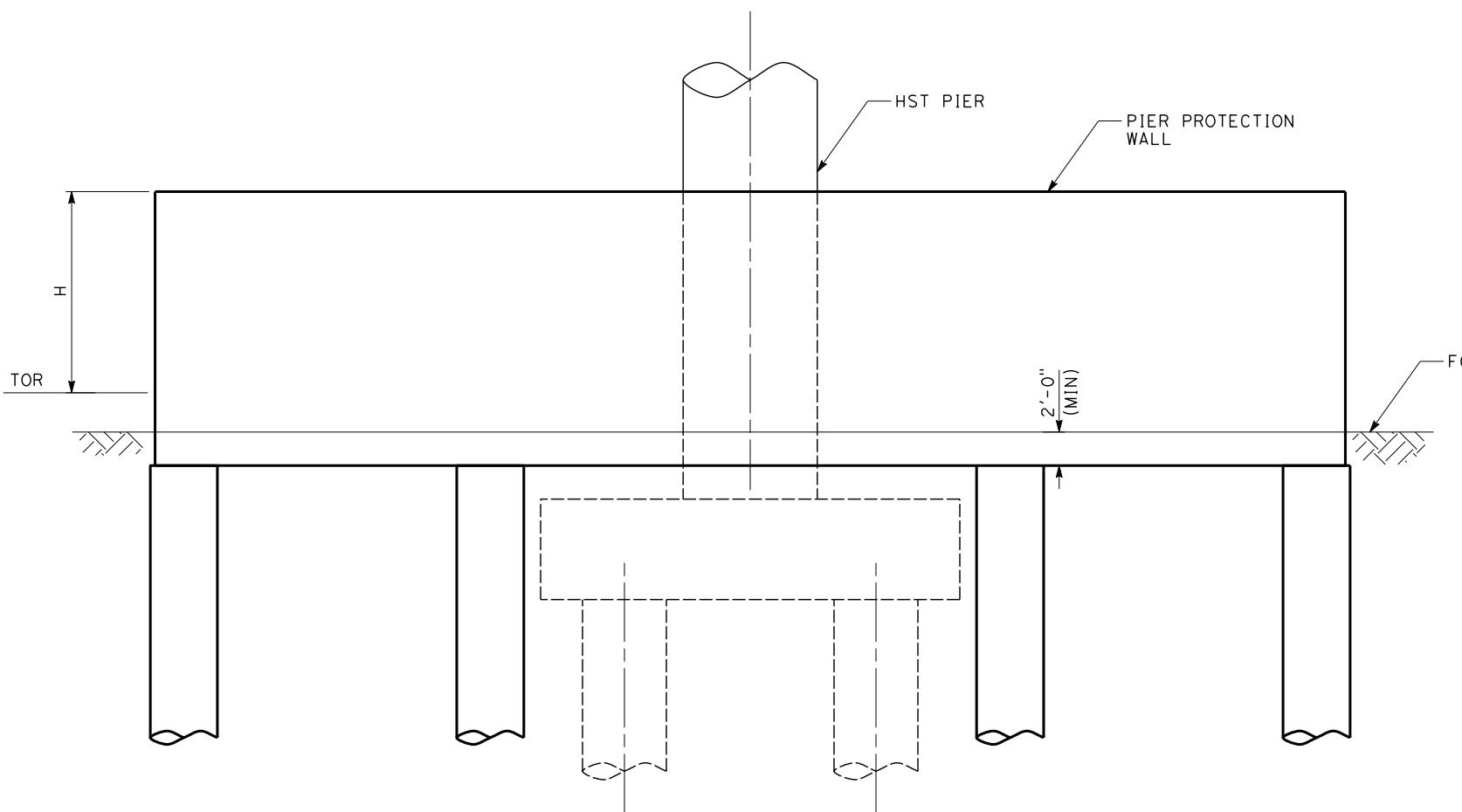
CONTRACT NO.
DRAWING NO.
DD-IP-101
SCALE
NO SCALE
SHEET NO.

NOTES:

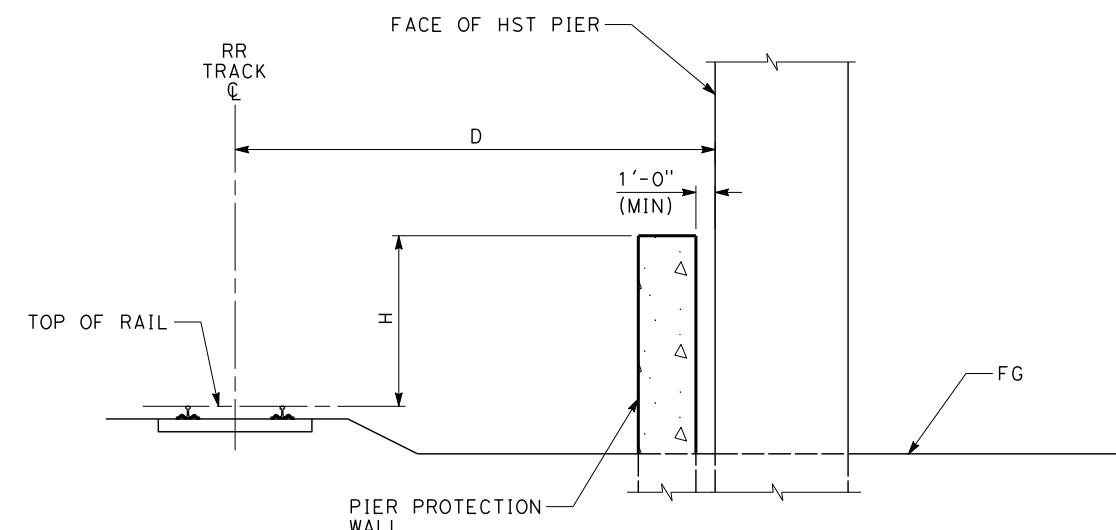
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. PIER PROTECTION WALL IS REQUIRED IF CLEARANCE FROM FACE OF HST STRUCTURE TO NEAREST RAILROAD TRACK CENTERLINE IS LESS THAN 25'-0".
3. LOCATION WHERE PIER PROTECTION WALL IS REQUIRED SHALL BE DETERMINED THROUGH SITE SPECIFIC HAZARD ANALYSES.



PLAN



ELEVATION



HST STRUCTURE PIER - PROTECTION WALL

CLEARANCE (D)

- ≥ 25 FT
- 12 FT - 25 FT
- ≤ 12 FT

WALL HEIGHT ABOVE TOP OF RAIL (H)

- N/A
- 6 FT
- 12 FT

					DESIGNED BY A. ABTAHI	DRAWN BY V. HUANTE	CHECKED BY H. NGUYEN	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014
REV	DATE	BY	CHK	APP	DESCRIPTION				

**PARSONS
BRINCKERHOFF**



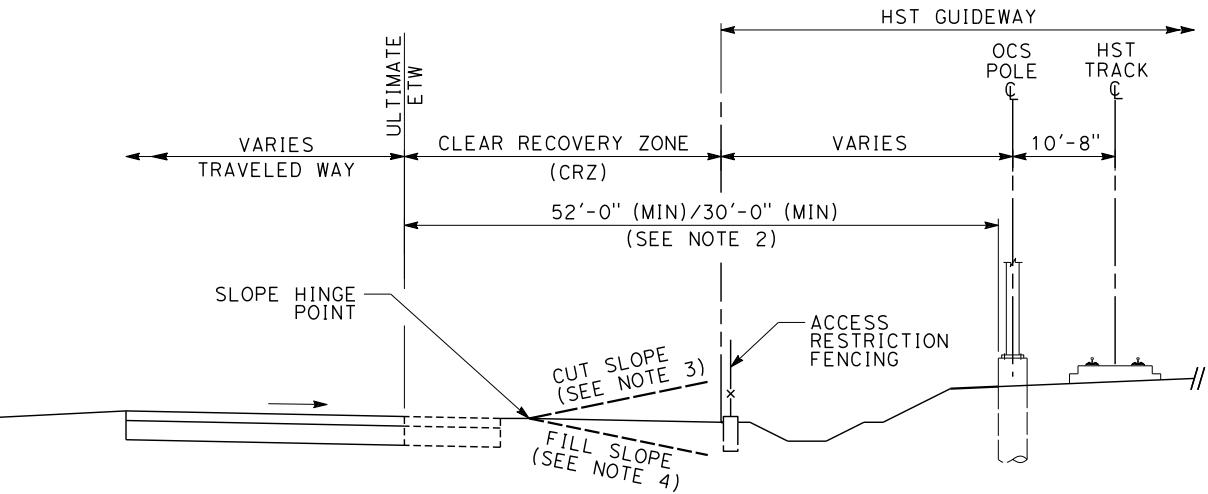
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

HST PIER PROTECTION
IN RAILROAD RIGHT OF WAY

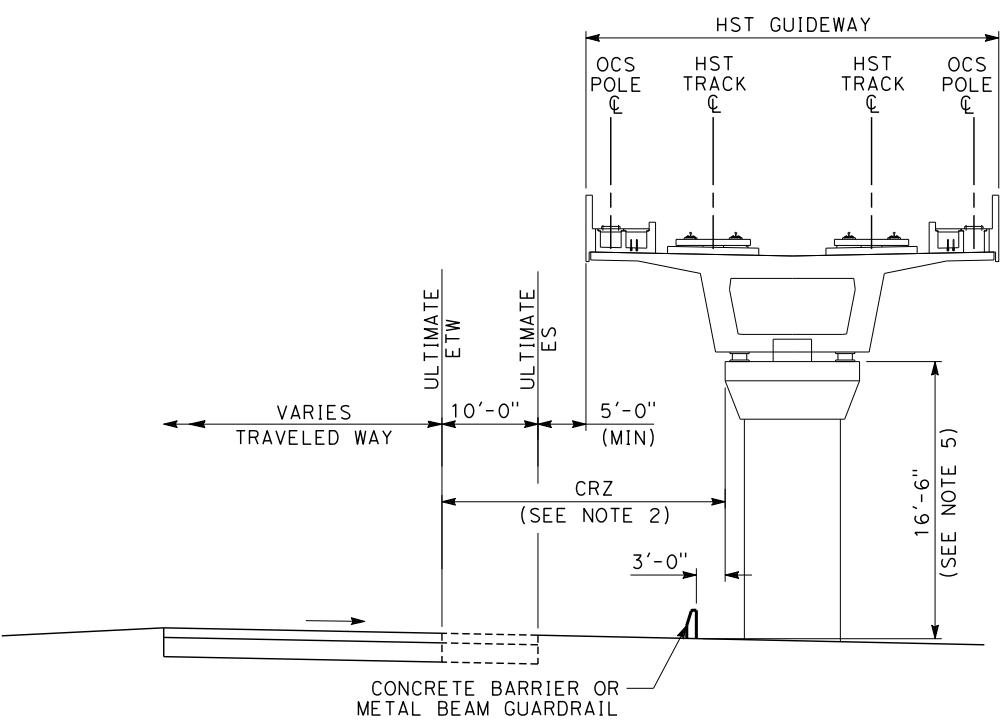
CONTRACT NO.
DRAWING NO.
DD-IP-102
SCALE
NO SCALE
SHEET NO.

NOTES:

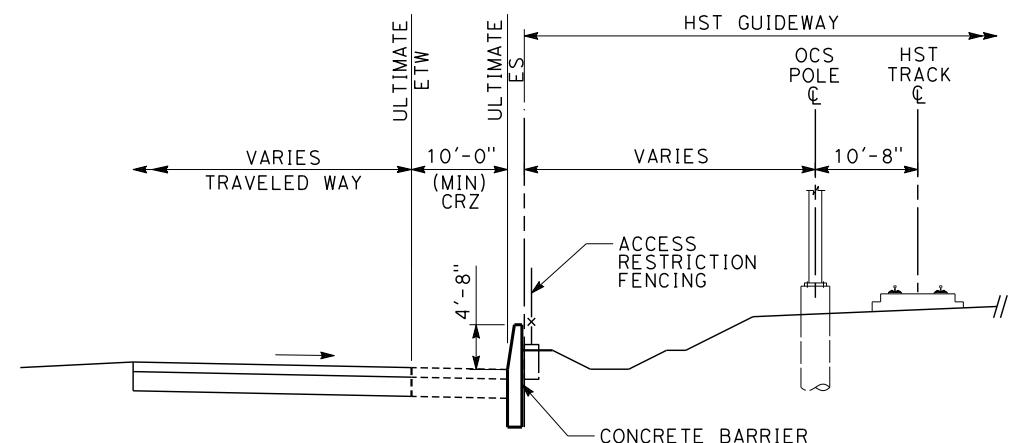
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. WHEN HST CORRIDOR IS CONSTRUCTED LONGITUDINALLY TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST AERIAL STRUCTURE COLUMN, OR ANY HST FIXED OBJECT IS LESS THAN 52'-0". IF HST CORRIDOR IS NOT LONGITUDINAL TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, THE CLEARANCE REQUIREMENT TO A HST FIXED OBJECT IS 30'-0".
3. IF HEIGHT DIFFERENTIAL AT ROADWAY CUT SLOPE HINGE POINT AND HST ROW FENCE IS GREATER THAN 7'-0", NO GUARDRAIL OR CONCRETE BARRIER IS REQUIRED.
4. IF THE HEIGHT DIFFERENTIAL AT ROADWAY FILL HINGE POINT AND HST ROW FENCE IS GREATER THAN 10'-0", GUARDRAIL WILL BE REQUIRED AT ROADWAY FILL HINGE POINT.
5. IF THE VERTICAL CLEARANCE BETWEEN THE RECOVERY AREA AND THE HST STRUCTURE BENT CAP IS LESS THAN 16'-6", METAL BEAM GUARDRAIL OR CONCRETE BARRIER WILL BE REQUIRED 3'-0" FROM EDGE OF HST BENT CAP.



HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY



HST AERIAL STRUCTURE ADJACENT TO HIGHWAY/ROADWAY



**HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY
WITH 10 FEET CLEAR RECOVERY ZONE (CRZ)**

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY A. ABTAHI DRAWN BY V. HUANTE CHECKED BY H. NGUYEN IN CHARGE G. LUSHEROVICH DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



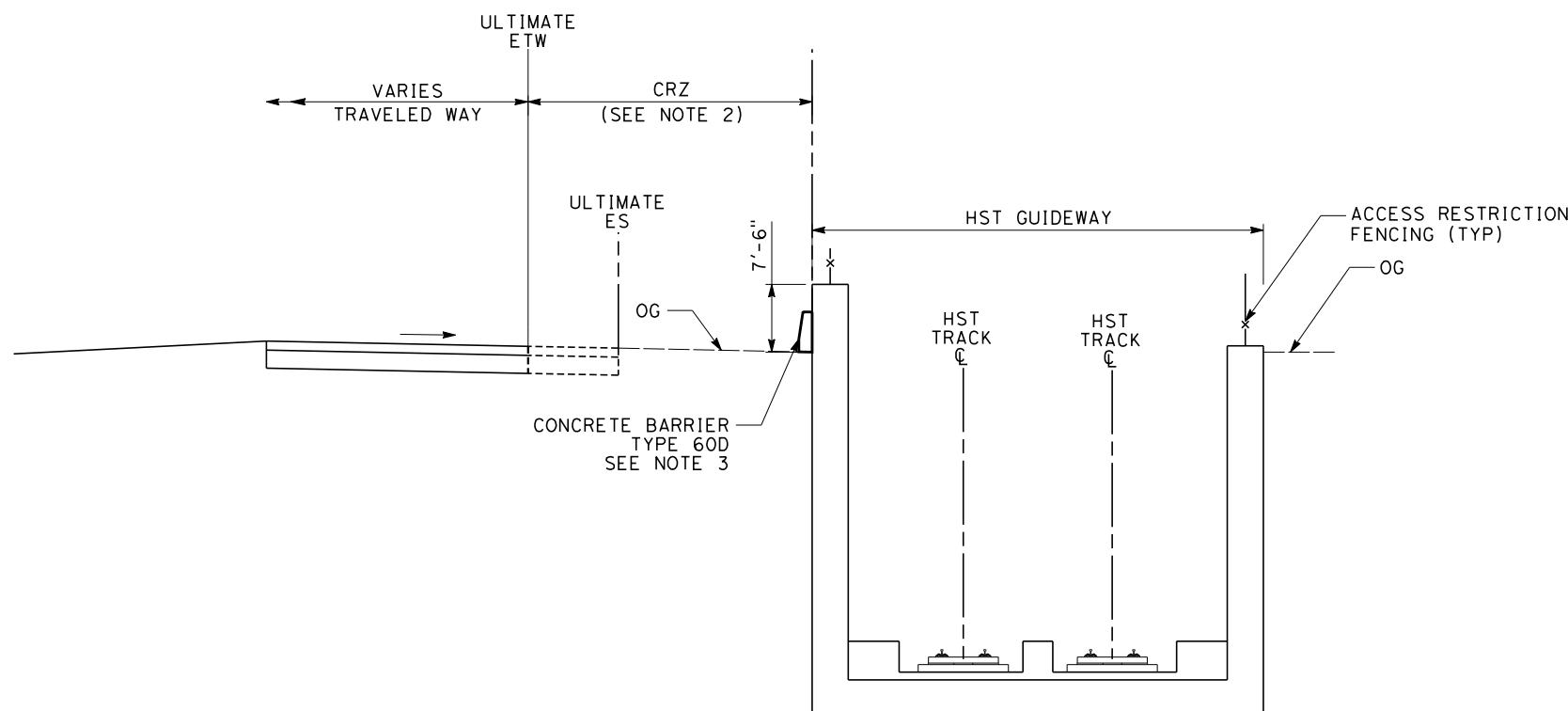
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

HST ADJACENT TO HIGHWAY/ROADWAY

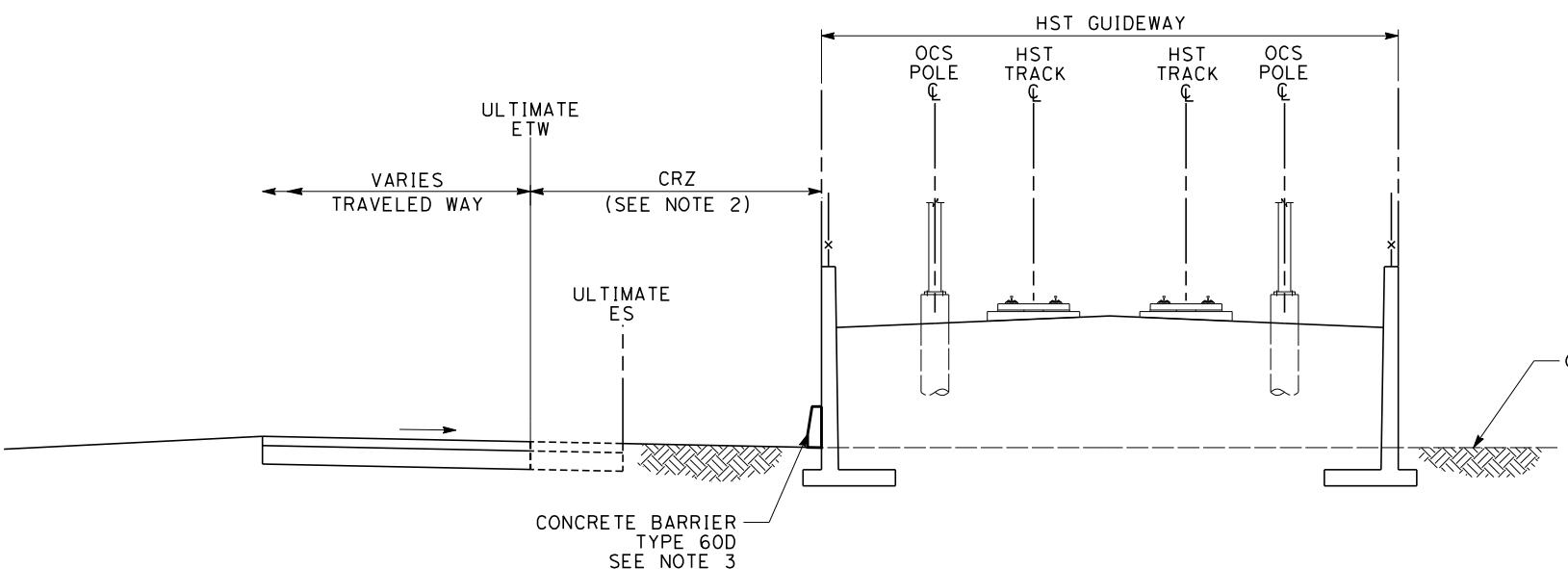
CONTRACT NO.
DRAWING NO.
DD-IP-103
SCALE
NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. IF THE DISTANCE BETWEEN HST WALL AND THE ULTIMATE ETW IS LESS THAN 52'-0", THE WALL HEIGHT SHALL BE 7'-6" ABOVE THE GROUND SURFACE AND CALTRANS CONCRETE BARRIER TYPE 60D SHALL BE INCLUDED IN CONSTRUCTION OF THE WALL.
3. FOR CONCRETE BARRIER TYPE AND THE END TREATMENT OF THE CONCRETE BARRIER REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST TRENCH



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST RETAINED FILL

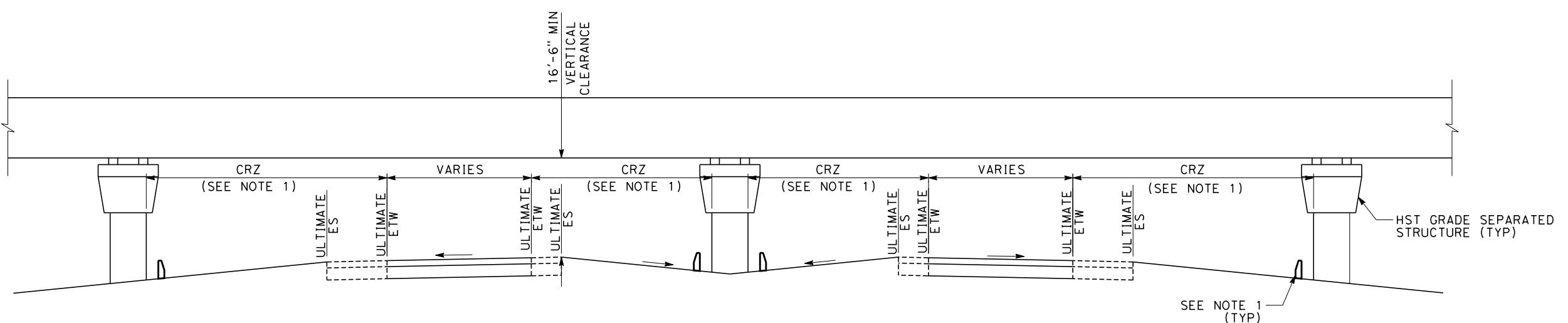
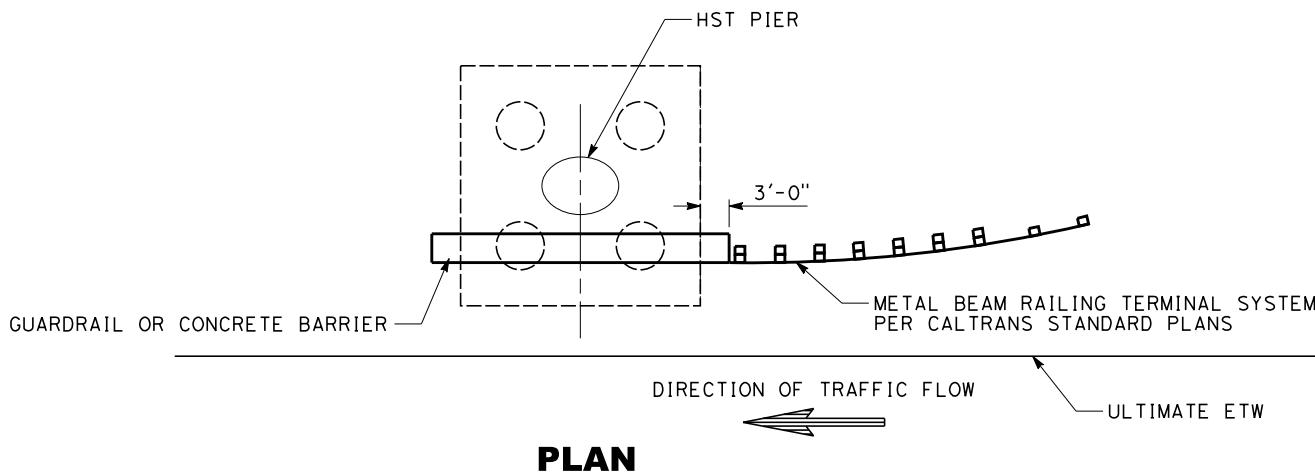
DESIGNED BY A. ABTAHI	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CONTRACT NO.
DRAWN BY V. HUANTE			DRAWING NO. DD-IP-104
CHECKED BY H. NGUYEN			SCALE NO SCALE
IN CHARGE G. LUSHEROVICH			SHEET NO.
DATE 08/29/2014			
REV	DATE	BY	CHK APP
DESCRIPTION			

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

HST TRENCH AND RETAINING WALL PROTECTION

NOTES:

1. METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST FIXED OBJECT IS LESS THAN 30'-0". REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.



HST GRADE SEPARATED STRUCTURE OVER HIGHWAY/ROADWAY WITH MEDIAN

REV	DATE	BY	CHK	APP	DESCRIPTION
	08/29/2014				

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014

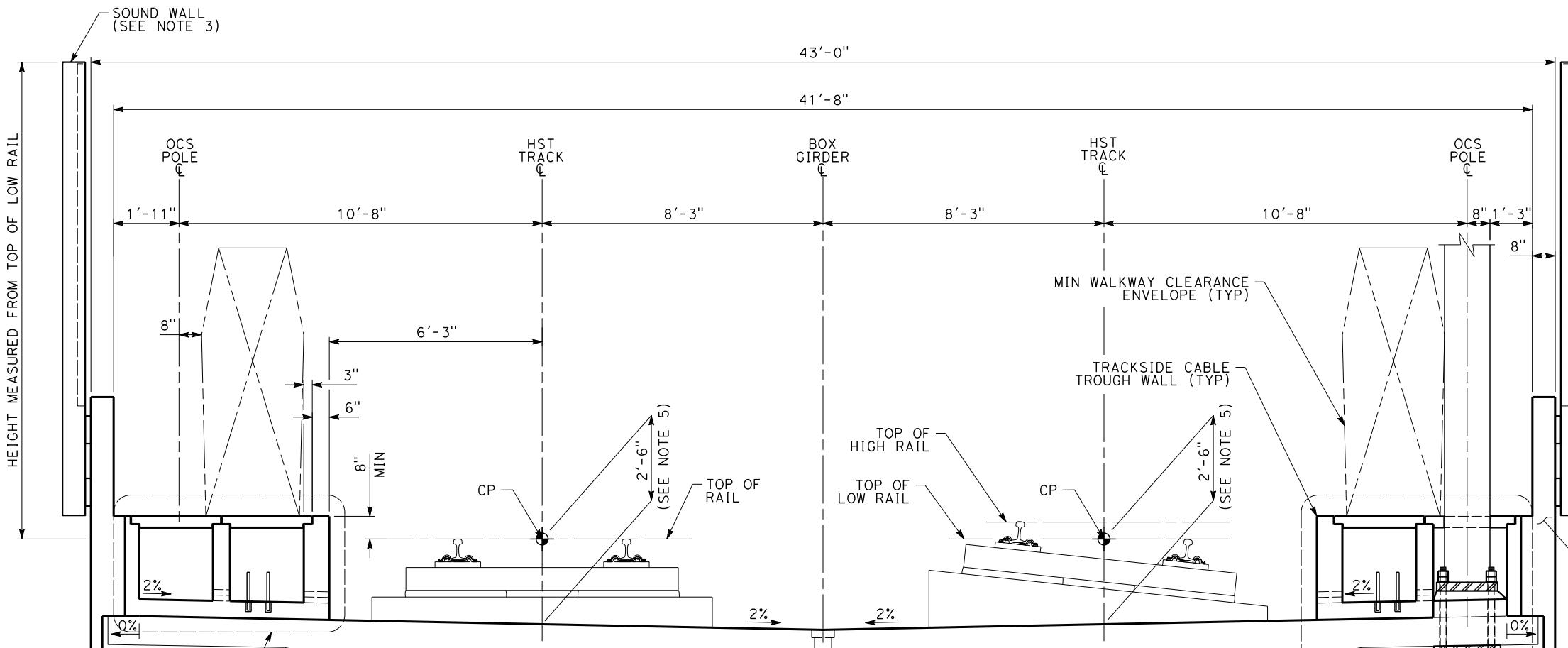
**PARSONS
BRINCKERHOFF**



CALIFORNIA HIGH-SPEED TRAIN PROJECT INTRUSION PROTECTION DIRECTIVE

HST PIER PROTECTION
IN HIGHWAY/ROADWAY RIGHT-OF-WAY

CONTRACT NO.
DRAWING NO.
DD-IP-105
SCALE
NO SCALE
SHEET NO.



CABLE TROUGH
SECTION CUT NOT AT OCS POLE

FOR TANGENT TRACK

FOR SUPERELEVATED TRACK

2 0 2 4
1/2"=1'-0"

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DESIGN AND INSTALL SHEAR REINFORCEMENTS OR CONNECTORS, WHICH ARE CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA, IN THE STRUCTURAL DECK BELOW THE TRACK SLAB IN ACCORDANCE WITH THE PROVISIONS PROVIDED BY THE TRACK WORK DESIGNER THROUGH SYSTEM INTERFACE WORKSHOP MEETINGS. THE TOP SURFACE OF STRUCTURAL DECK BELOW THE TRACK SLAB SHALL BE PROPERLY ROUGHENED BY THE CONTRACTOR. SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE HOT-DIP GALVANIZED. THE DESIGN AND INSTALLATION OF SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE CONSIDERED AS PART OF THE CONTRACTOR'S SCOPE OF WORK.
5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.

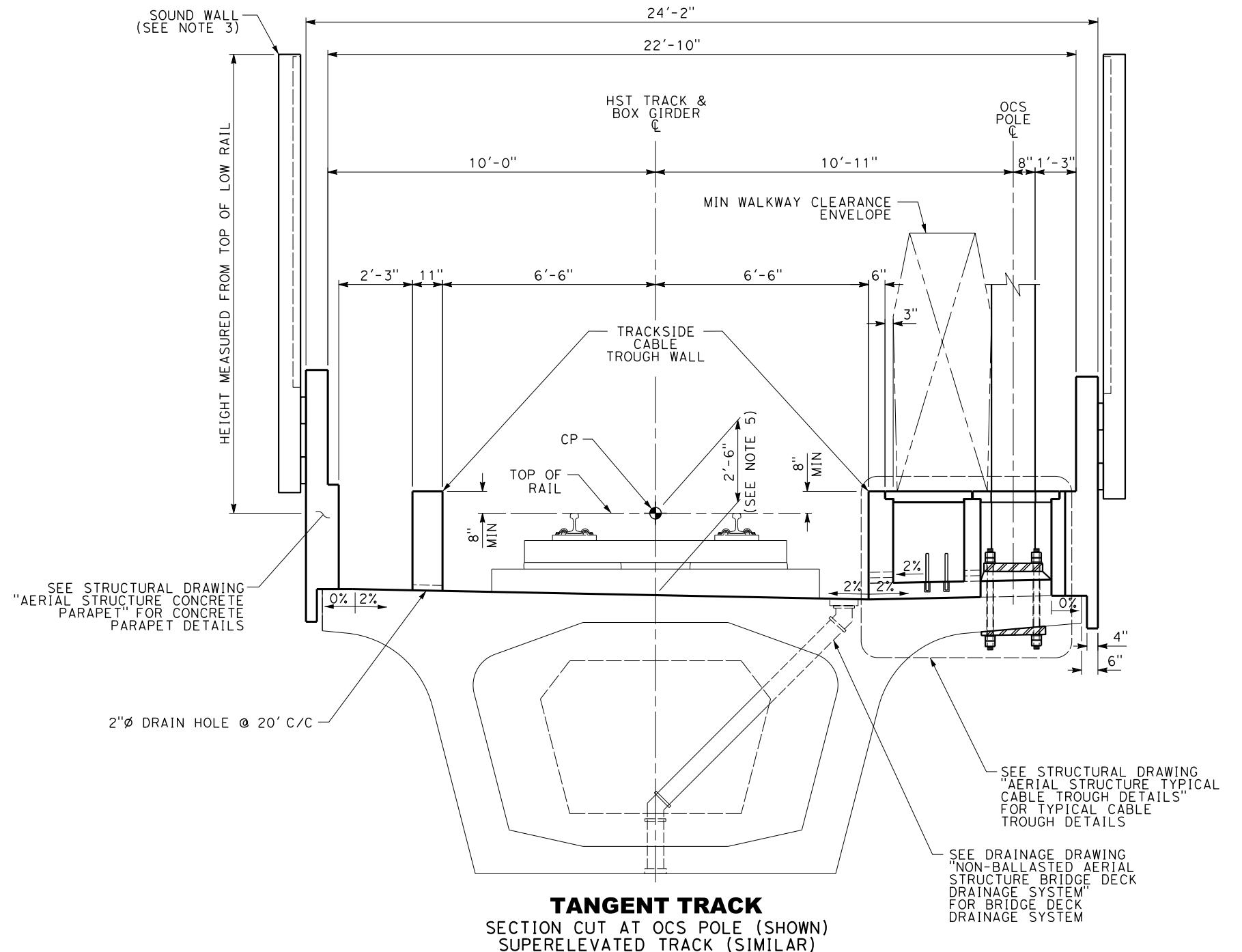
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 07/18/2014

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**
TYPICAL CROSS SECTION
AERIAL STRUCTURE
TWO TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.	
DRAWING NO.	DD-ST-100
SCALE	AS SHOWN
SHEET NO.	



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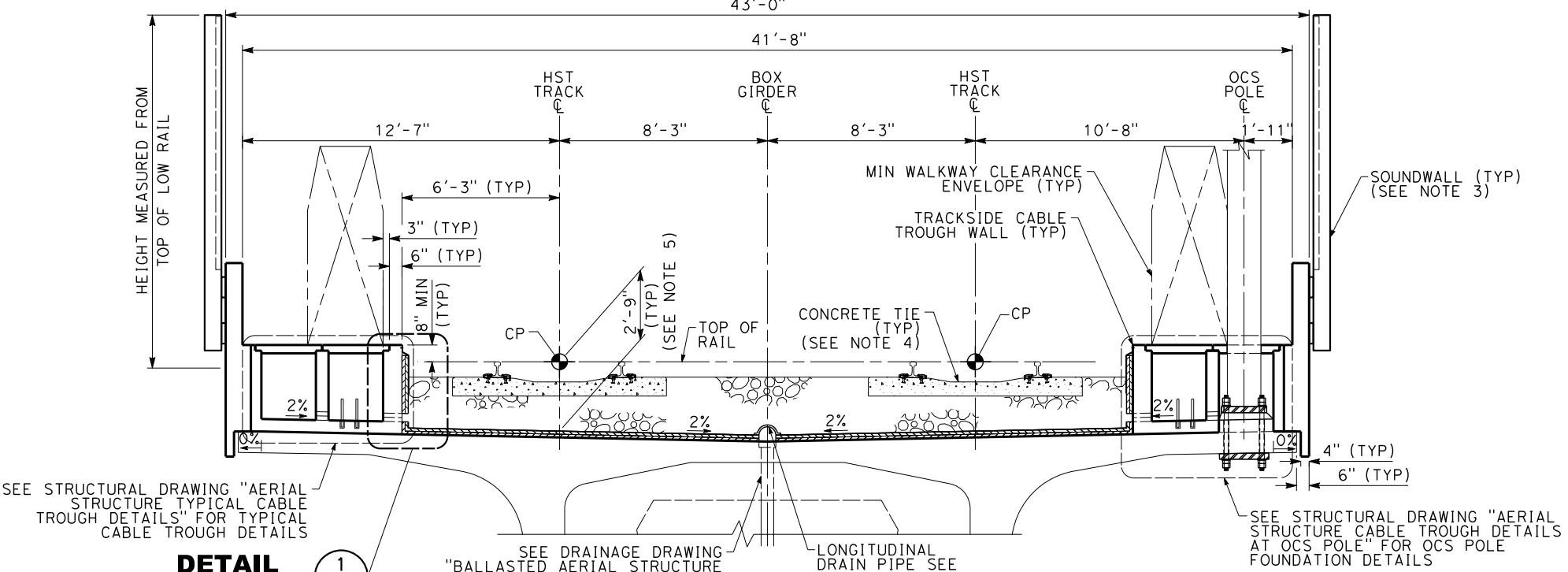
DESIGNED BY P. LIN	
DRAWN BY V. HUANTE	
CHECKED BY K. PUGASAP	
IN CHARGE G. LUSHEROVICH	
DATE 07/18/2014	

**PATRONS
BRINCKERHOFF**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

TYPICAL CROSS SECTION
AERIAL STRUCTURE
ONE TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.	
DRAWING NO.	DD-ST-101
SCALE	AS SHOWN
SHEET NO.	



SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR TYPICAL CABLE TROUGH DETAILS

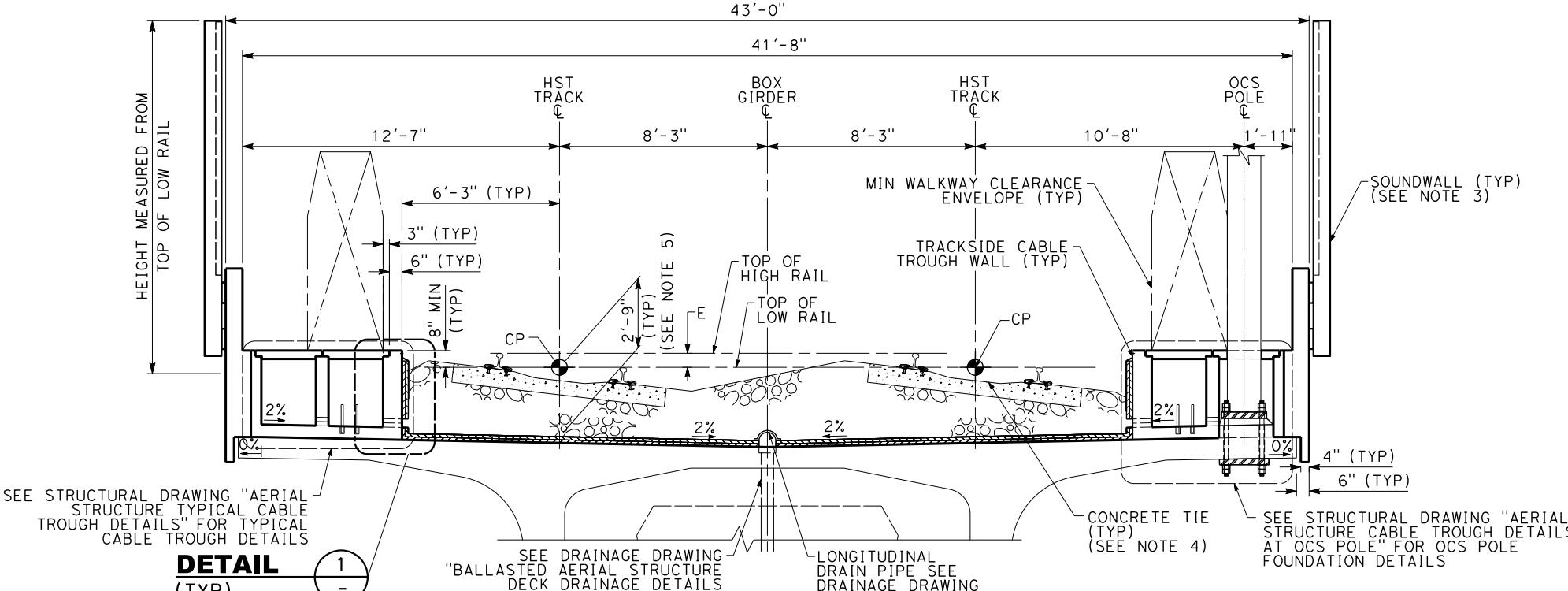
DETAIL
(TYP)

CABLE TROUGH WITHOUT OCS POLE

TANGENT TRACK

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
4. CONCRETE TIES SHOWN ARE FOR ILLUSTRATION ONLY.
5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.

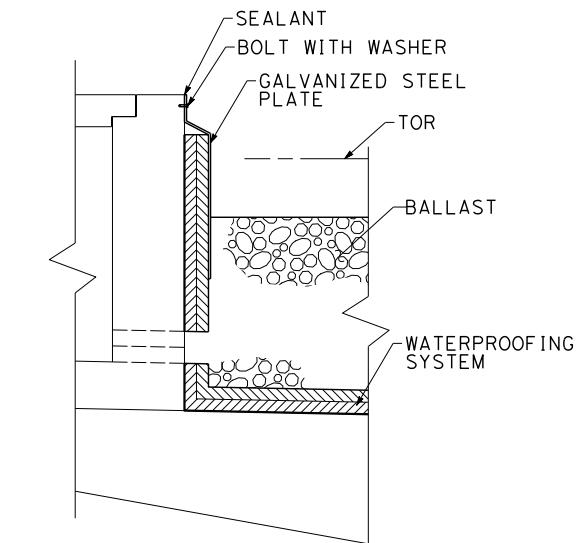


SEE STRUCTURAL DRAWING "AERIAL TROUGH DETAILS" FOR TYPICAL CABLE TROUGH DETAILS

DETAIL
(TYP)

CABLE TROUGH WITHOUT OCS POLE

SUPERELEVATED TRACK



1
WATERPROOFING SYSTEM
ON CONCRETE DECK

REV	DATE	BY	CHK	APP	DESCRIPTION
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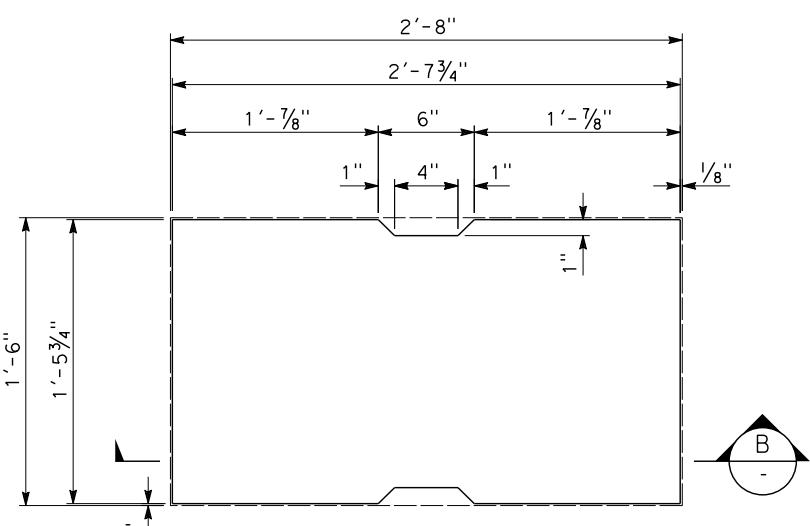
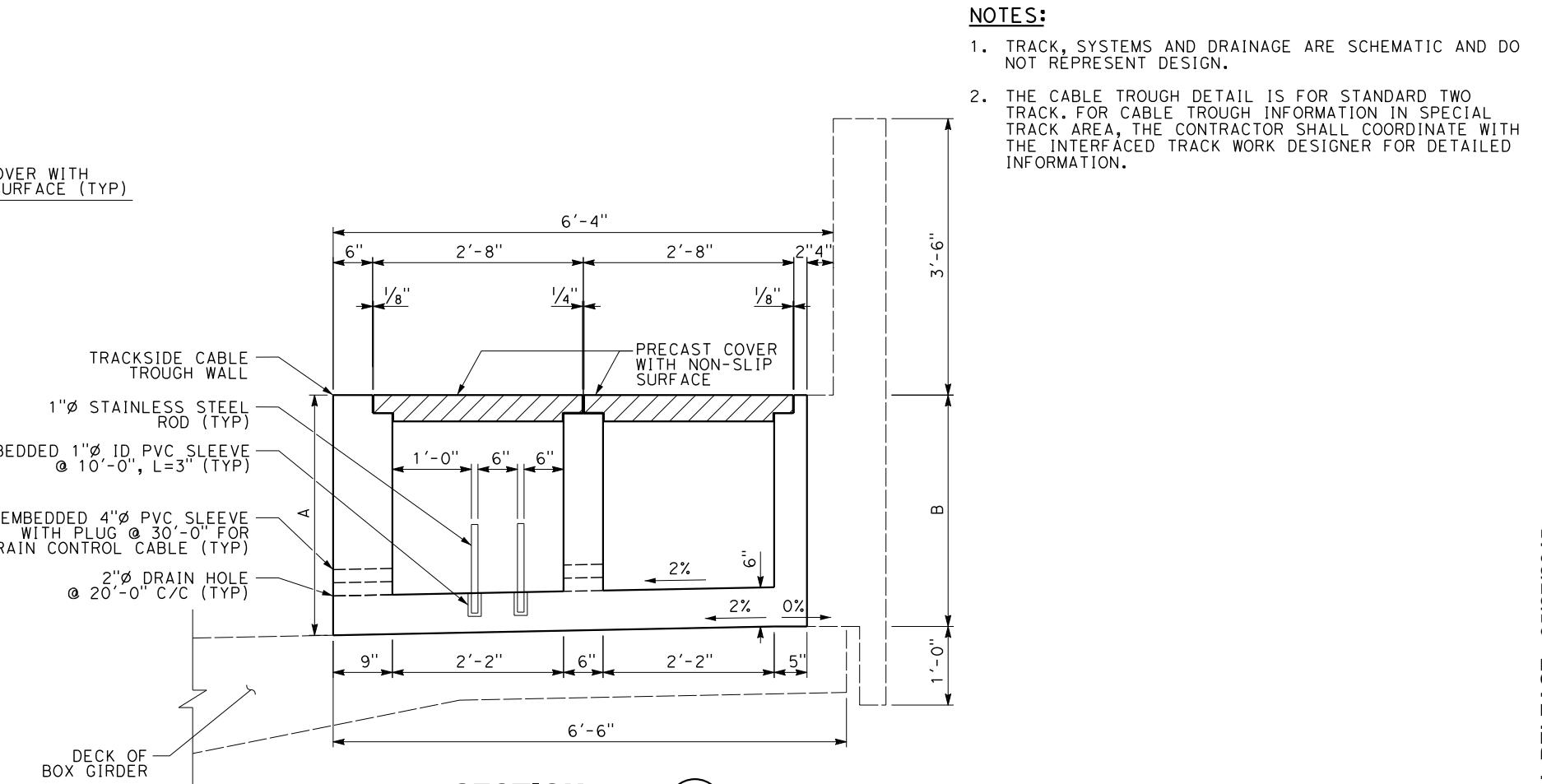
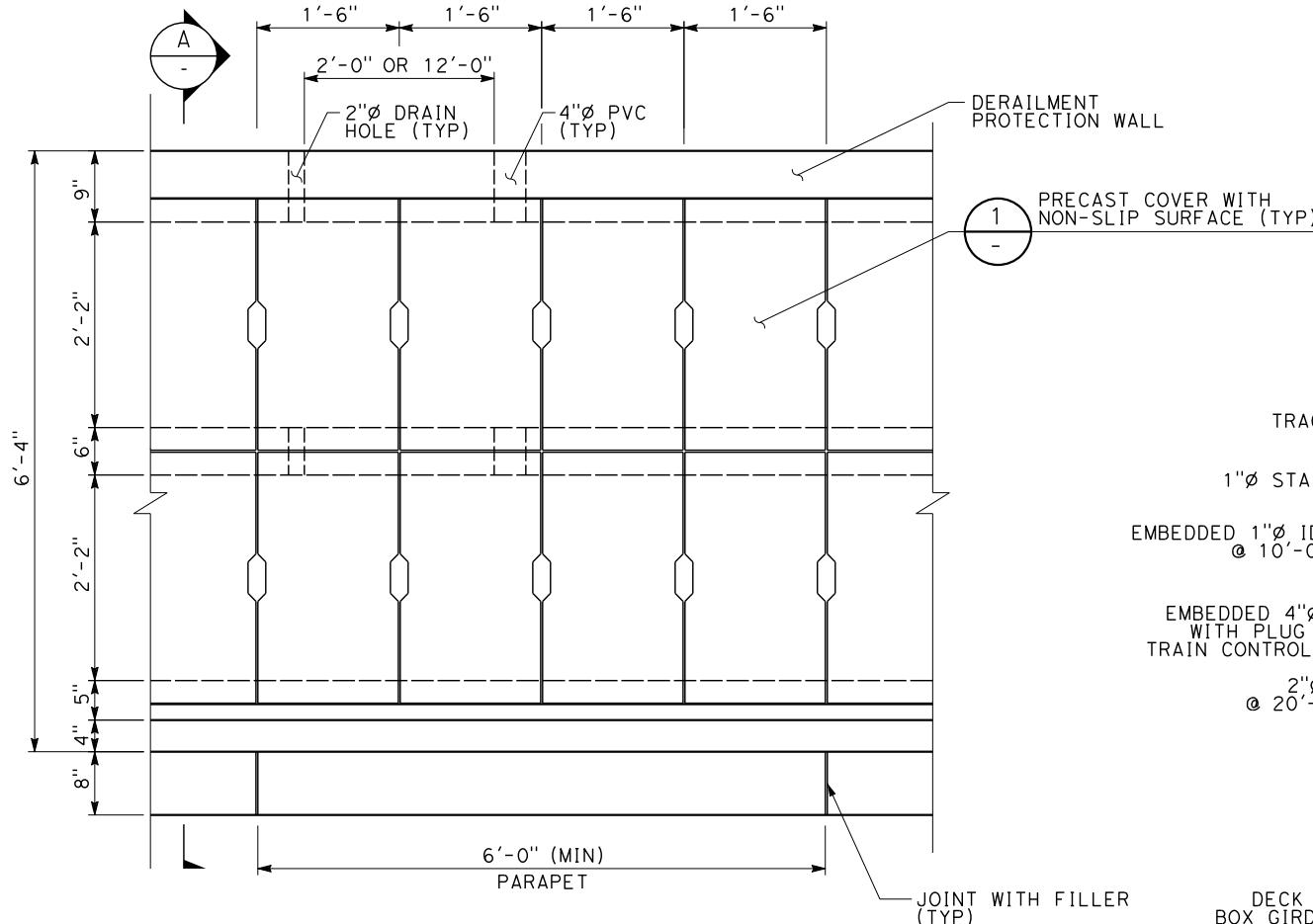
DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY G. HARRIS	IN CHARGE G. LUSHEROVICH	DATE 07/18/2014
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**PARSONS
BRINCKERHOFF**



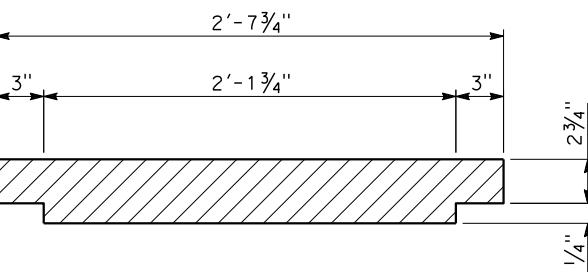
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**
TYPICAL CROSS SECTION
AERIAL STRUCTURE
TWO TRACK BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.	
DRAWING NO.	DD-ST-102
SCALE	NO SCALE
SHEET NO.	



	NON-BALLASTED TRACK		BALLASTED TRACK	
	TWO TRACK	ONE TRACK	TWO TRACK	ONE TRACK
A	3'-1/2"	3'-3 1/6"	3'-3 1/2" + T*	3'-6 1/6" + T*
B	2'-11 1/8"	3'-2 1/4"	2'-2 1/8" + T*	3'-5 1/4" + T*

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



REV	DATE	BY	CHK	APP	DESCRIPTION	DATE
					01/24/2014	

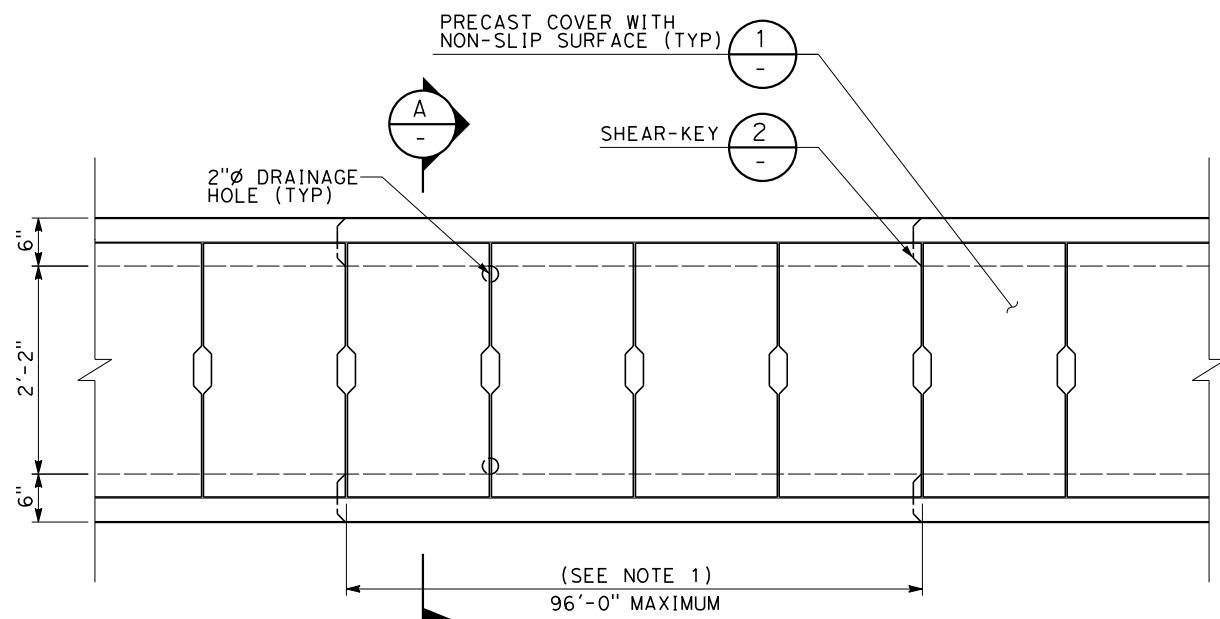
**PARSONS
BRINCKERHOFF**



CALIFORNIA HIGH-SPEED TRAIN PROJECT STRUCTURAL DIRECTIVE

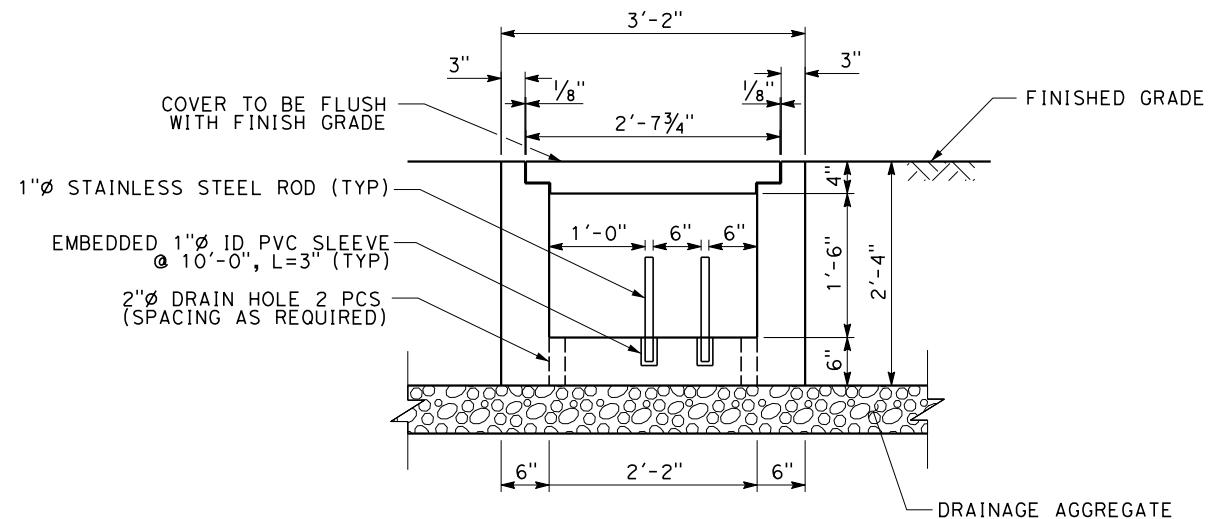
AERIAL STRUCTURE
TYPICAL CABLE TROUGH DETAILS

CONTRACT NO.	
DRAWING NO.	DD-ST-900
SCALE	AS SHOWN
SHEET NO.	

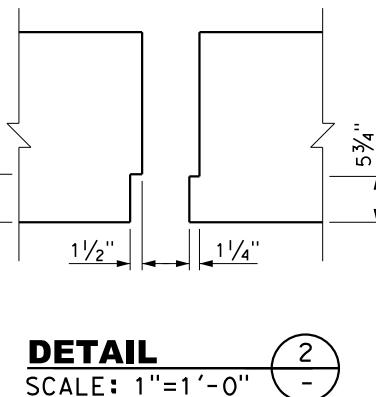
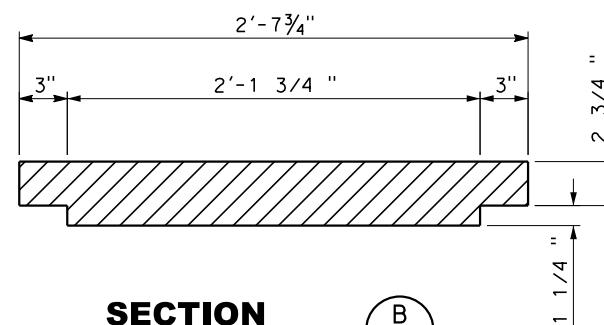
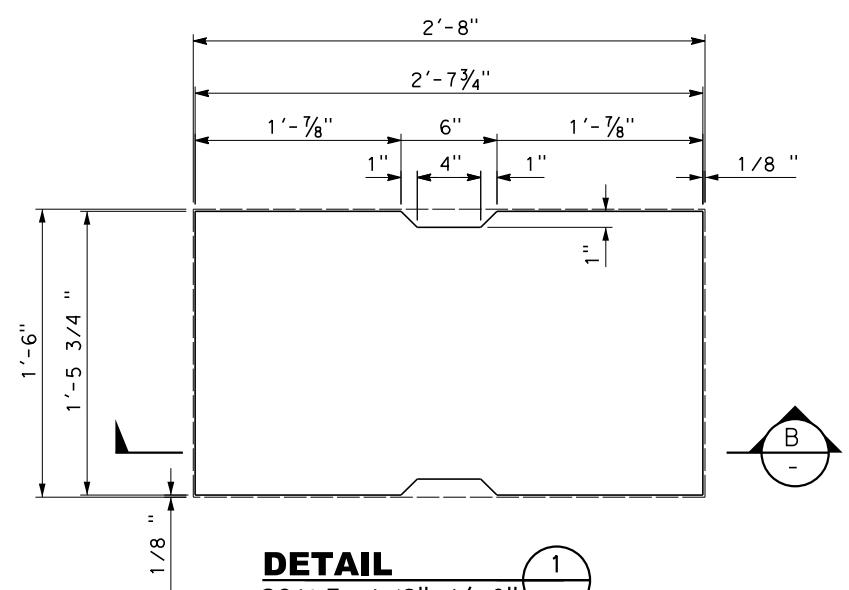


NOTES:

- CONTRACTOR SHALL DETERMINE WORK SEGMENT LENGTH BASED ON CONSTRUCTION METHOD.



SECTION
SCALE: 1"=1'-0"



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY B. VALENTI	DRAWN BY V. LAVERDE	CHECKED BY P. LIN	IN CHARGE G. LUSHEROVICH	DATE 08/29/2014

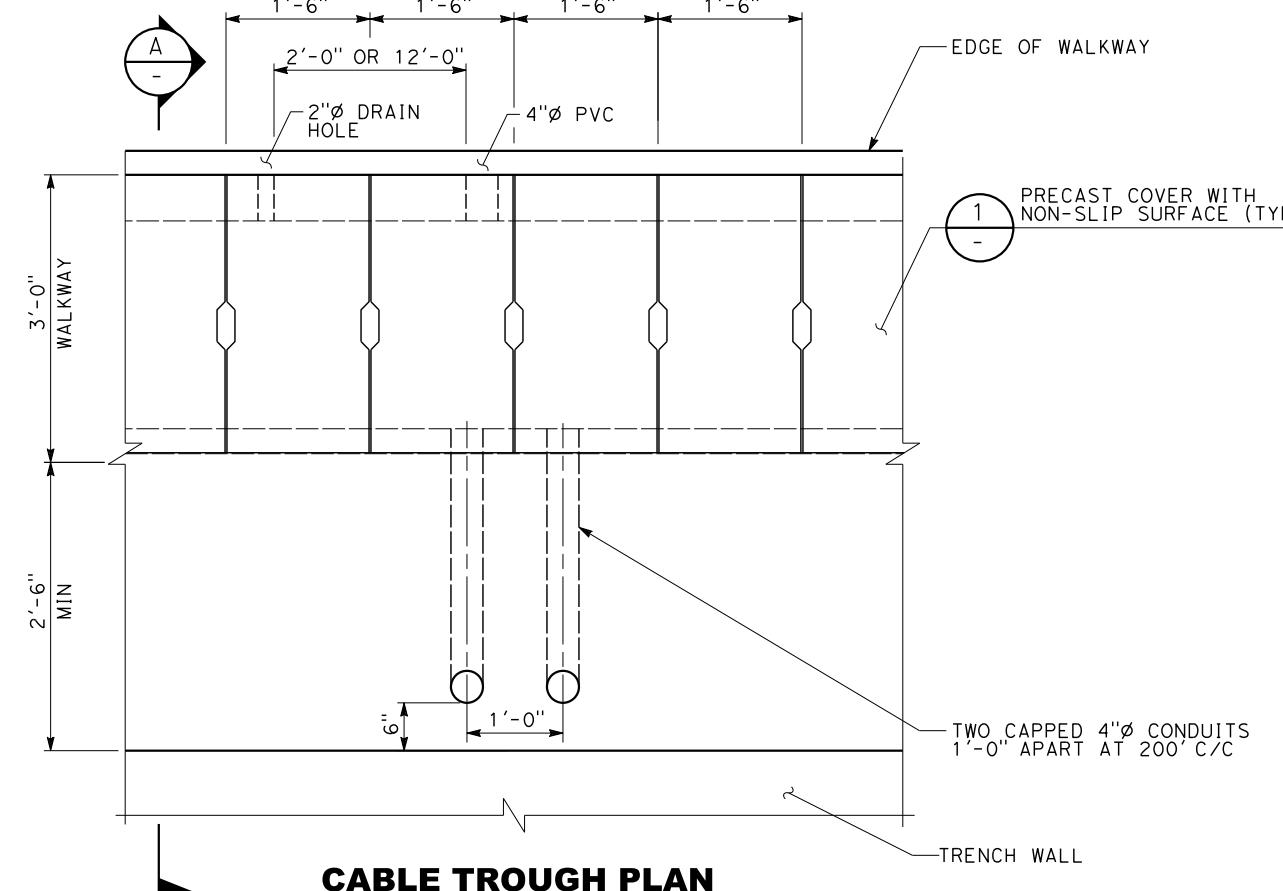
**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

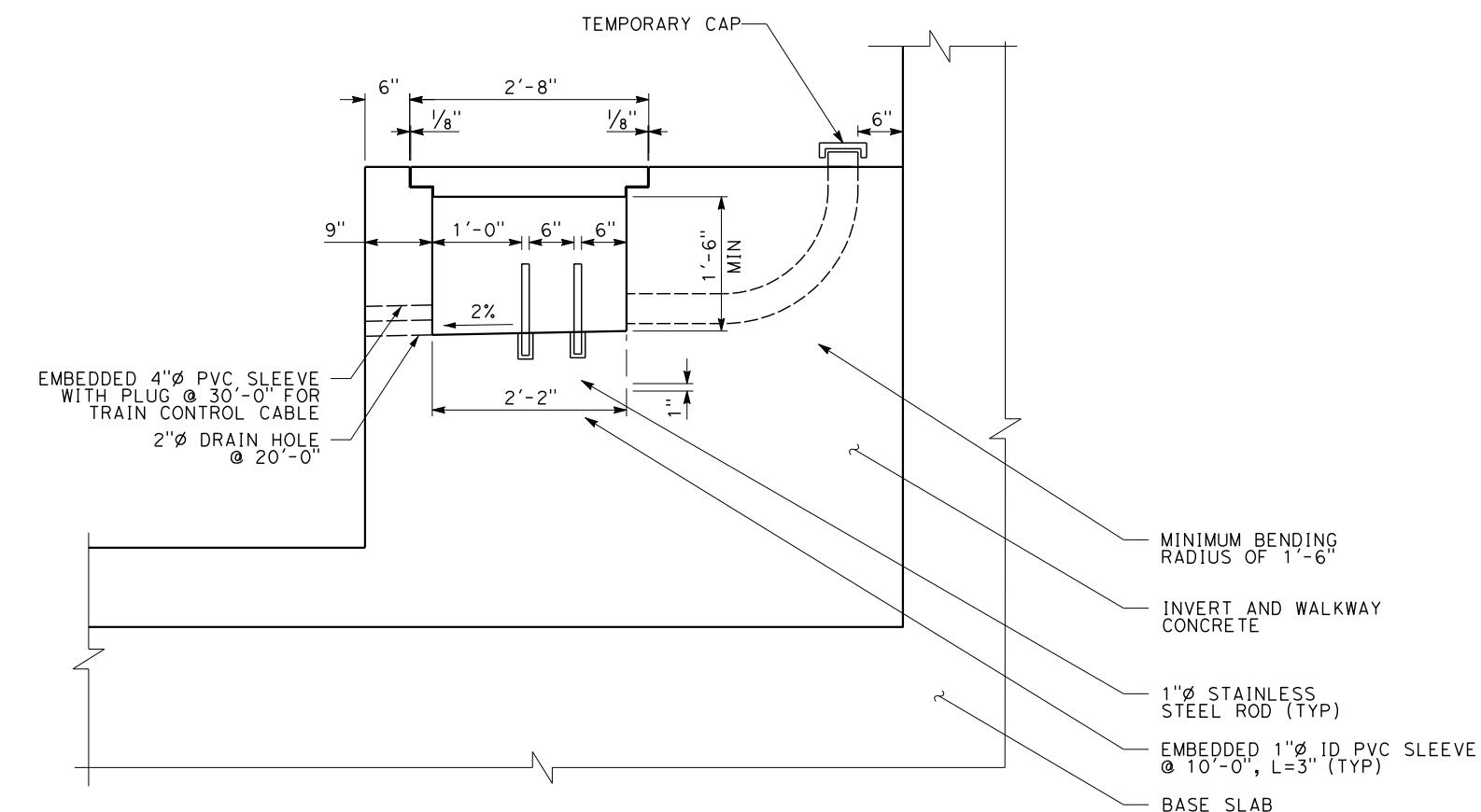
TYPICAL CABLE TROUGH DETAILS
EMBANKMENT/CUT

CONTRACT NO.	
DRAWING NO.	DD-ST-901
SCALE	AS SHOWN
SHEET NO.	



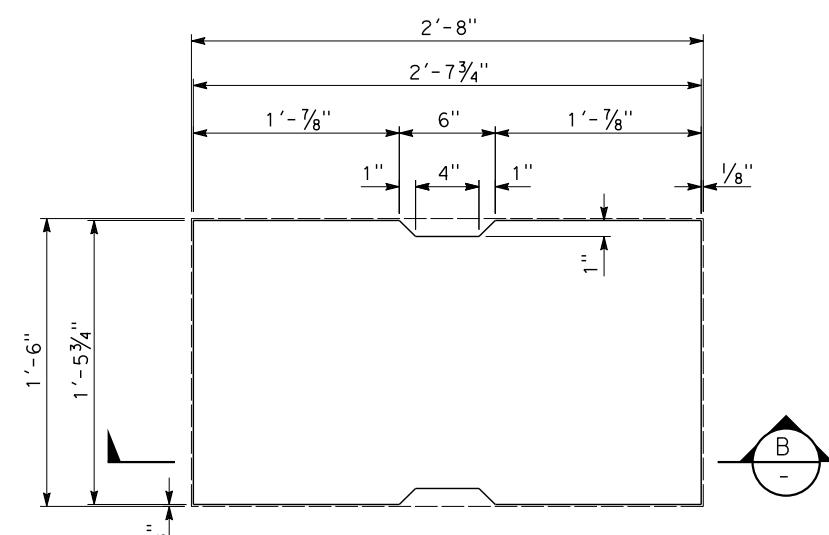
**CABLE TROUGH PLAN
AND CONDUIT DETAIL**

SCALE: 1"=1'-0"



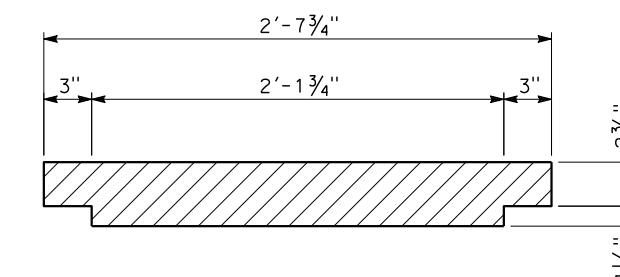
SECTION

SCALE: 1"=1'-0"



DETAIL

SCALE: 1/2"=1'-0"



SECTION

SCALE: 1/2"=1'-0"

DESIGNED BY B. VALENTI
DRAWN BY V. HUANTE
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

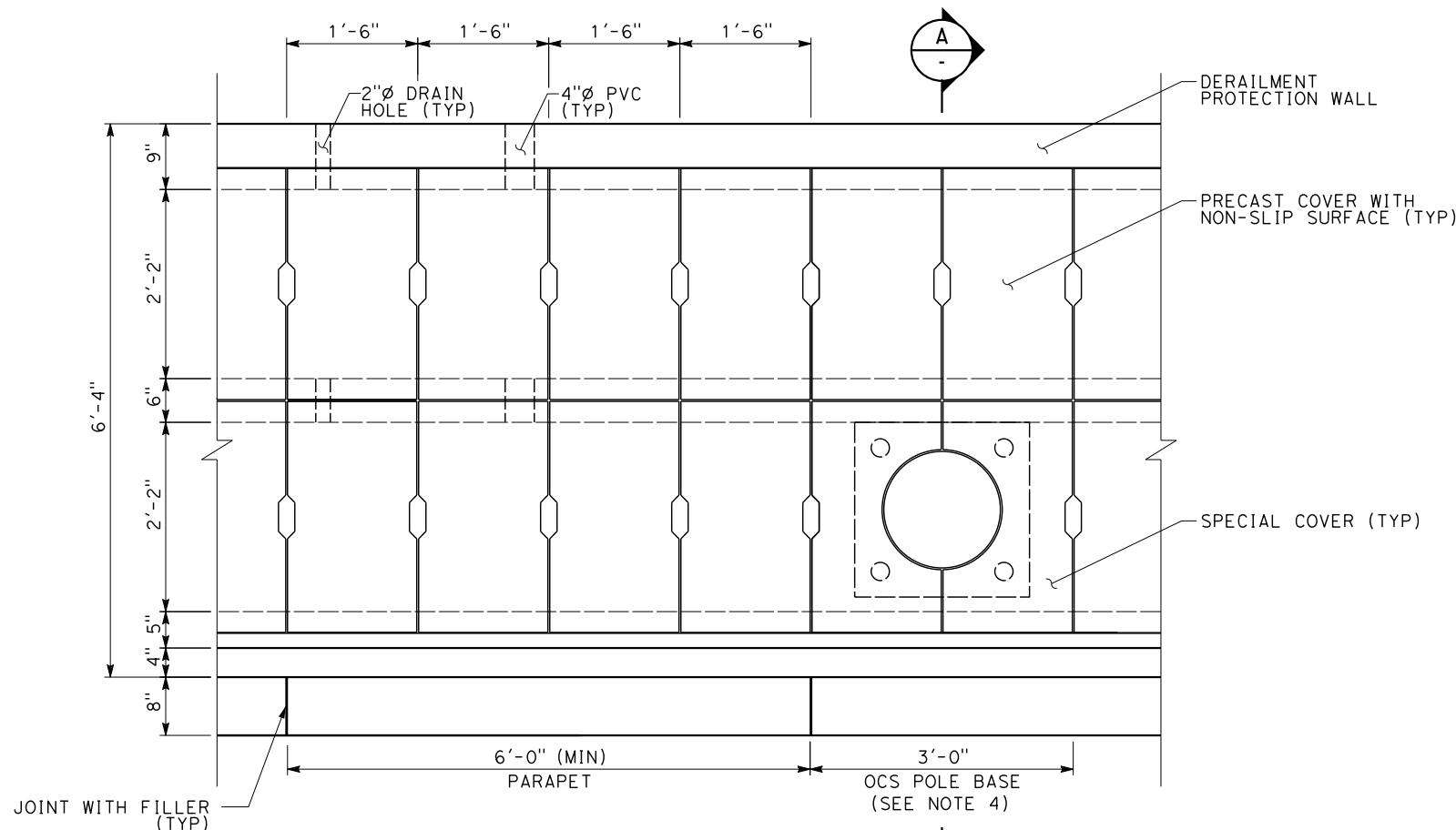
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

CABLE TROUGH DETAILS
TRENCH/CUT AND COVER TUNNEL

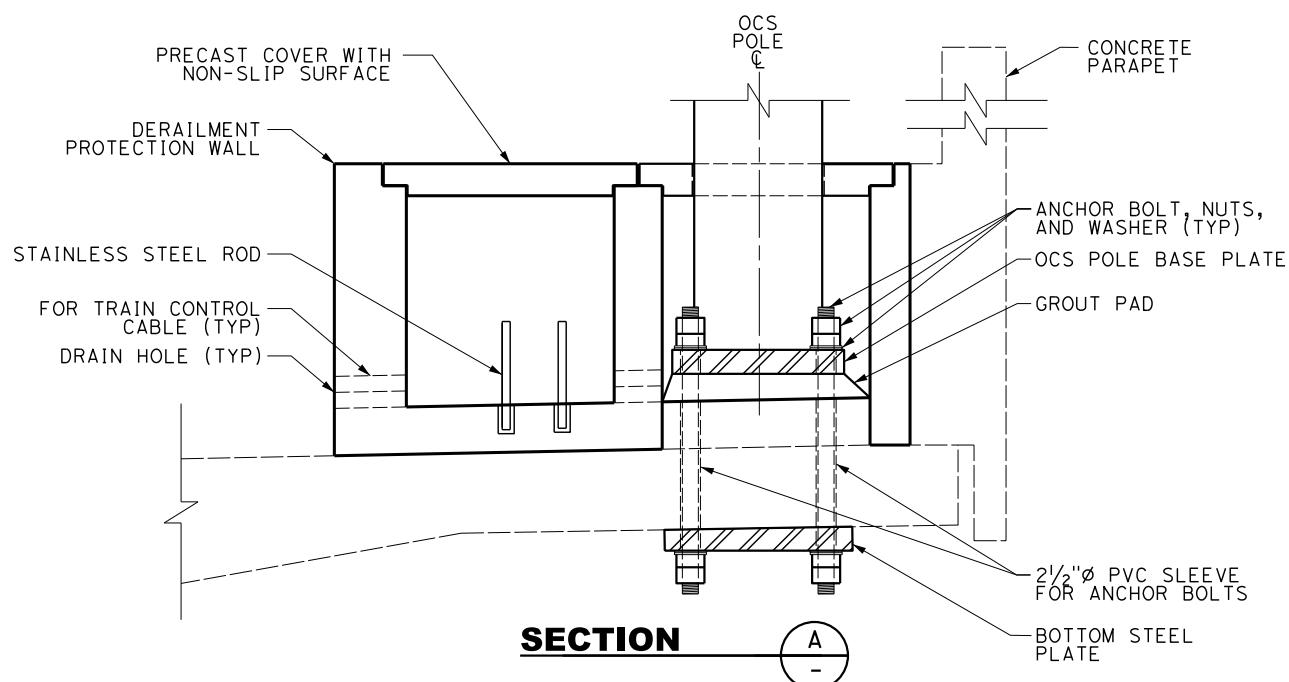
CONTRACT NO.
DRAWING NO. DD-ST-902
SCALE AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR PRECAST COVER DETAIL, SEE DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS".
3. SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR DIMENSIONS NOT SHOWN.
4. OCS POLE, ANCHOR BOLT ASSEMBLIES, BASE PLATES, AND GROUT PAD FOR OCS POLE FOUNDATION ARE SHOWN FOR ILLUSTRATION ONLY. THE LOCATION OF EMBEDDED PVC SLEEVES AND LOADS FOR DESIGN OF OCS POLE FOUNDATION SHALL CONFORM TO THE REQUIREMENTS IN THE STRUCTURAL CHAPTER OF THE DESIGN CRITERIA.



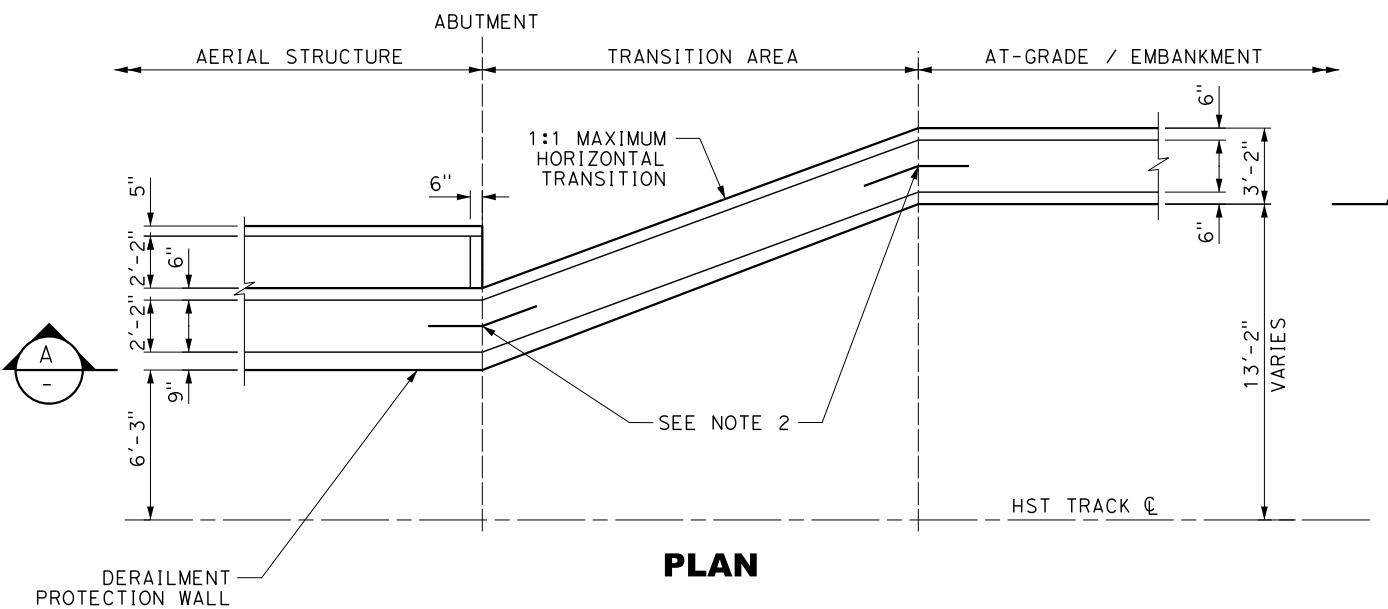
**CABLE TROUGH AT
OCS POLE PLAN**



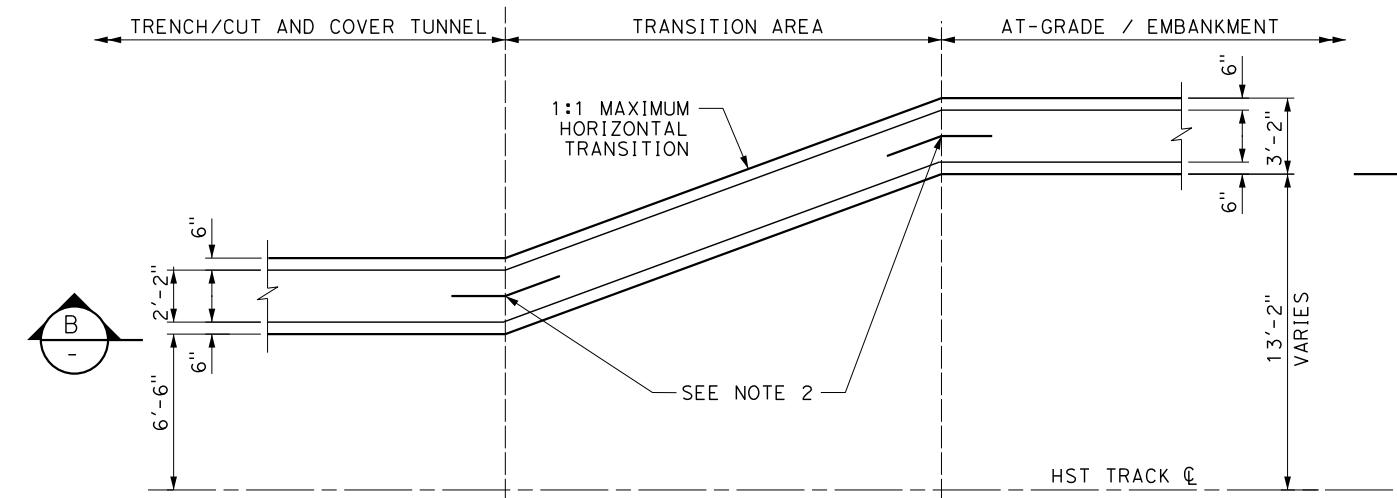
DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CALIFORNIA HIGH-SPEED TRAIN PROJECT STRUCTURAL DIRECTIVE	CONTRACT NO. DRAWING NO. DD-ST-903
REV	DATE	BY	CHK	APP	DESCRIPTION		AERIAL STRUCTURE CABLE TROUGH DETAILS AT OCS POLE	SCALE AS SHOWN SHEET NO.

NOTES:

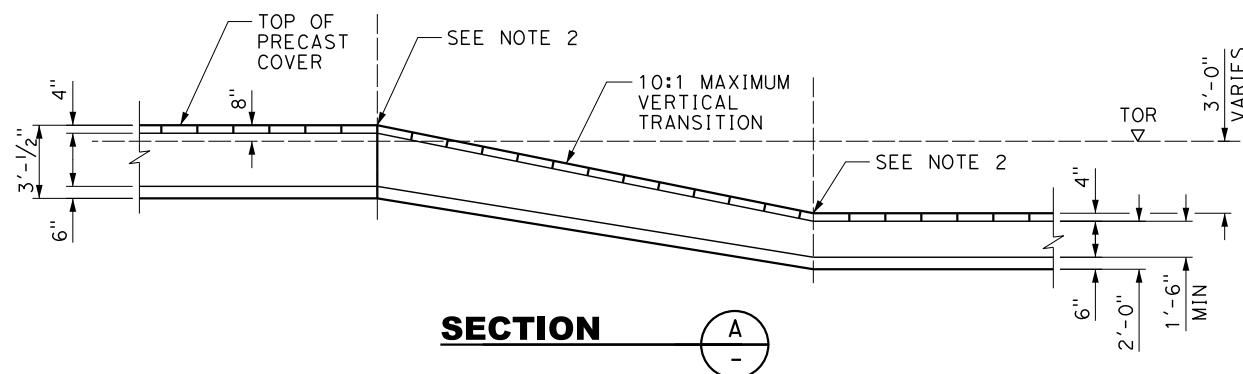
1. BOTH HORIZONTAL AND VERTICAL TRANSITION OF THE CABLE TROUGH SHALL OCCUR WITHIN THE LONGITUDINAL STRUCTURAL TRANSITION ZONE.
2. SPECIAL TRANSITION TROUGH AND COVER WILL BE REQUIRED AT ANGLE POINTS. MAXIMIZE EXTENT OF STANDARD PIECES.



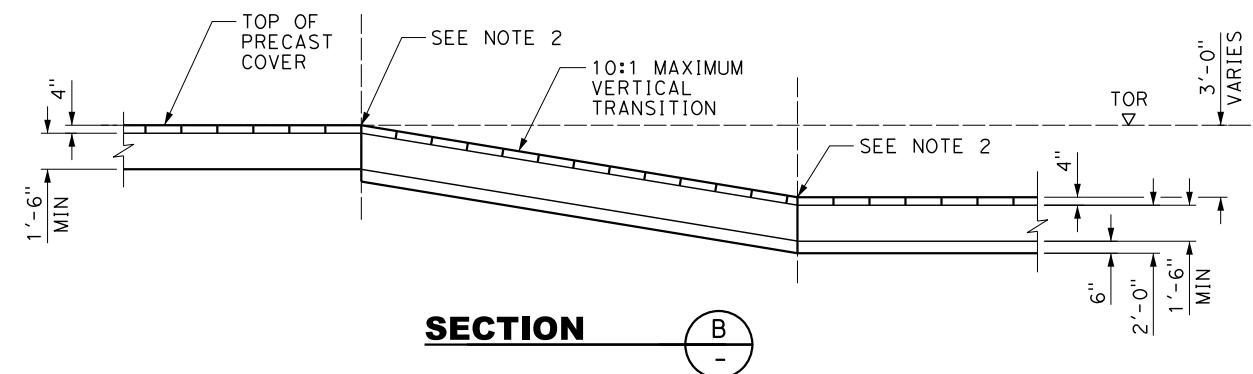
PLAN



PLAN



SECTION



SECTION

AERIAL STRUCTURE TO AT-GRADE/EMBANKMENT

TRENCH/CUT AND COVER TUNNEL TO AT-GRADE/EMBANKMENT

4 0 4 8
1/4"=1'-0"

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY B. VALENTI	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

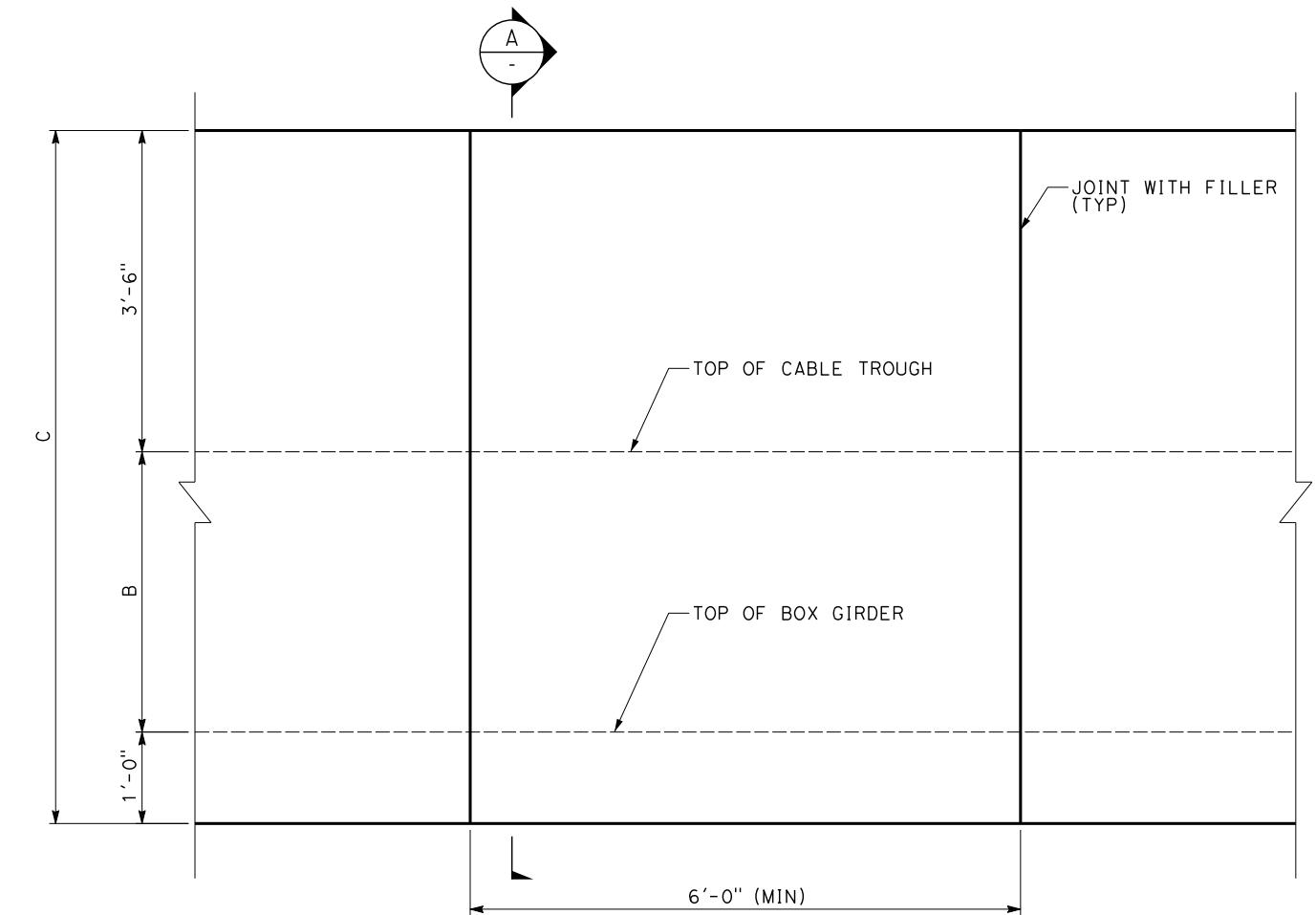
**PARSONS
BRINCKERHOFF**



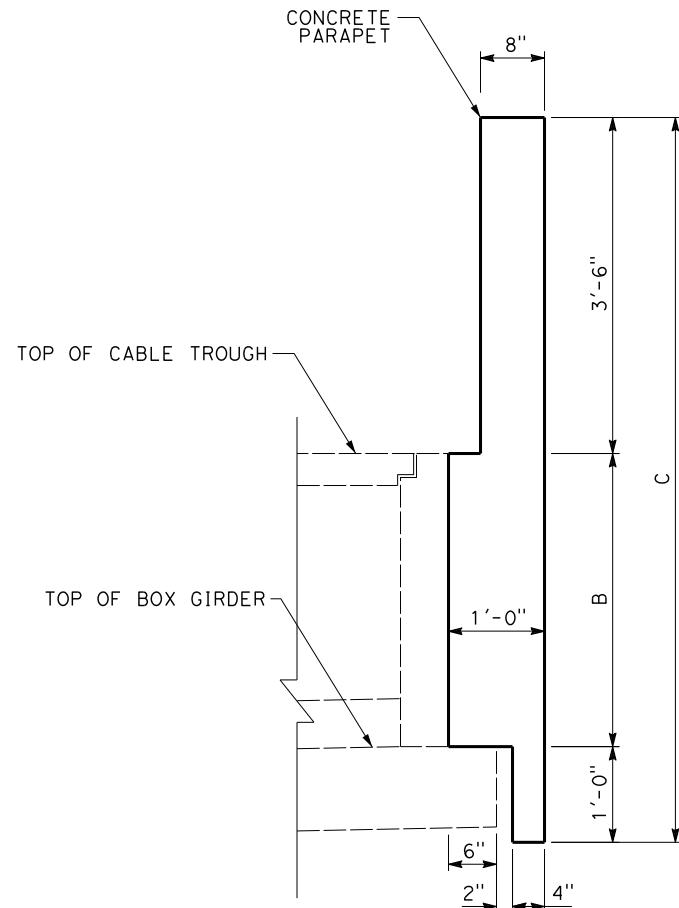
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

CABLE TROUGH LAYOUT TRANSITION AREAS

CONTRACT NO.	
DRAWING NO.	DD-ST-904
SCALE	AS SHOWN
SHEET NO.	



CONCRETE PARAPET
ELEVATION VIEW



SECTION A -

NON-BALLASTED TRACK		BALLASTED TRACK	
	TWO TRACK	ONE TRACK	TWO TRACK
B	2'-11 1/8"	3'-2 1/4"	3'-2 1/8" + T*
C	7'-5 5/8"	7'-8 1/4"	7'-8 5/8" + T*

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

AERIAL STRUCTURE
CONCRETE PARAPET

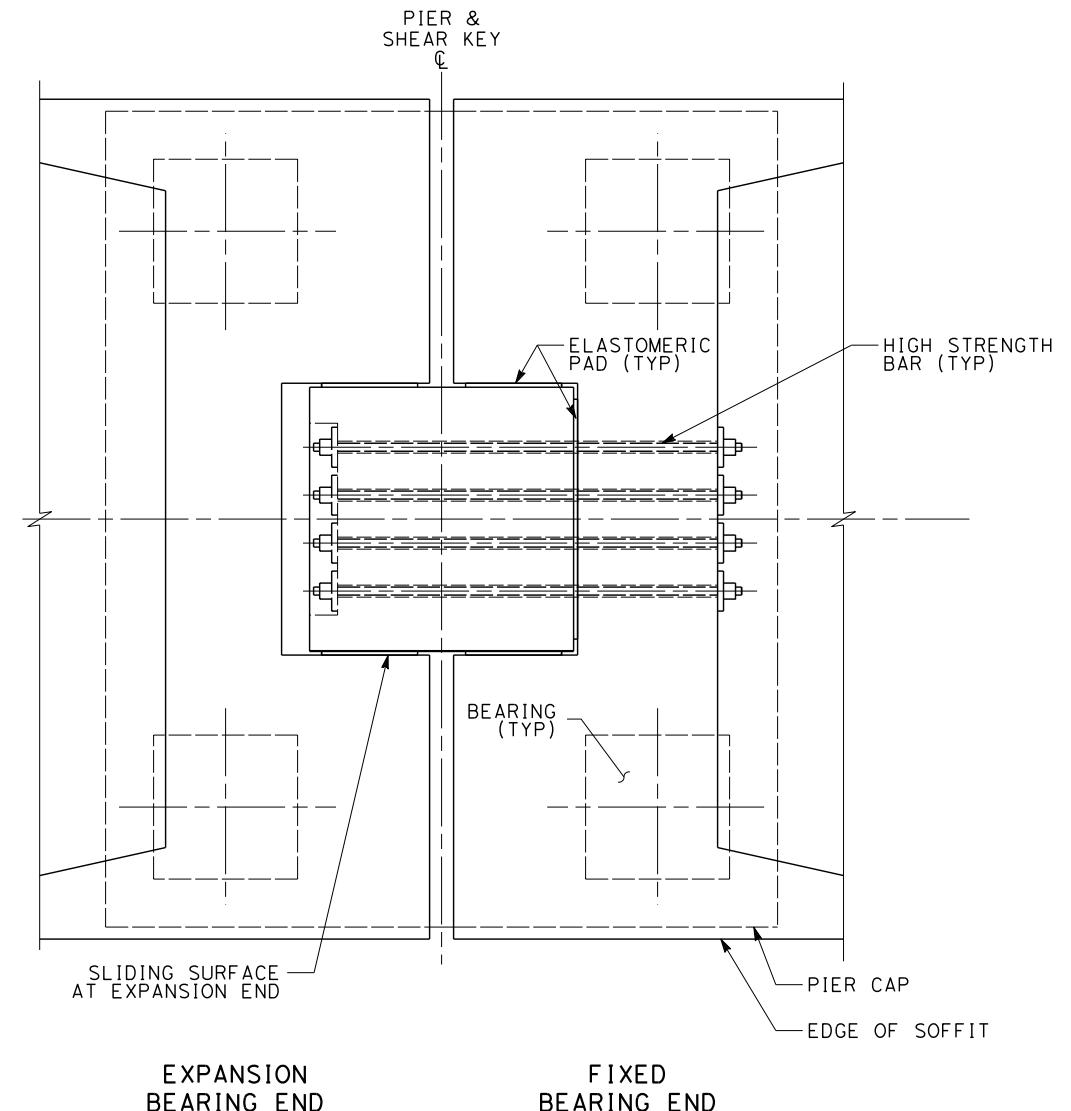
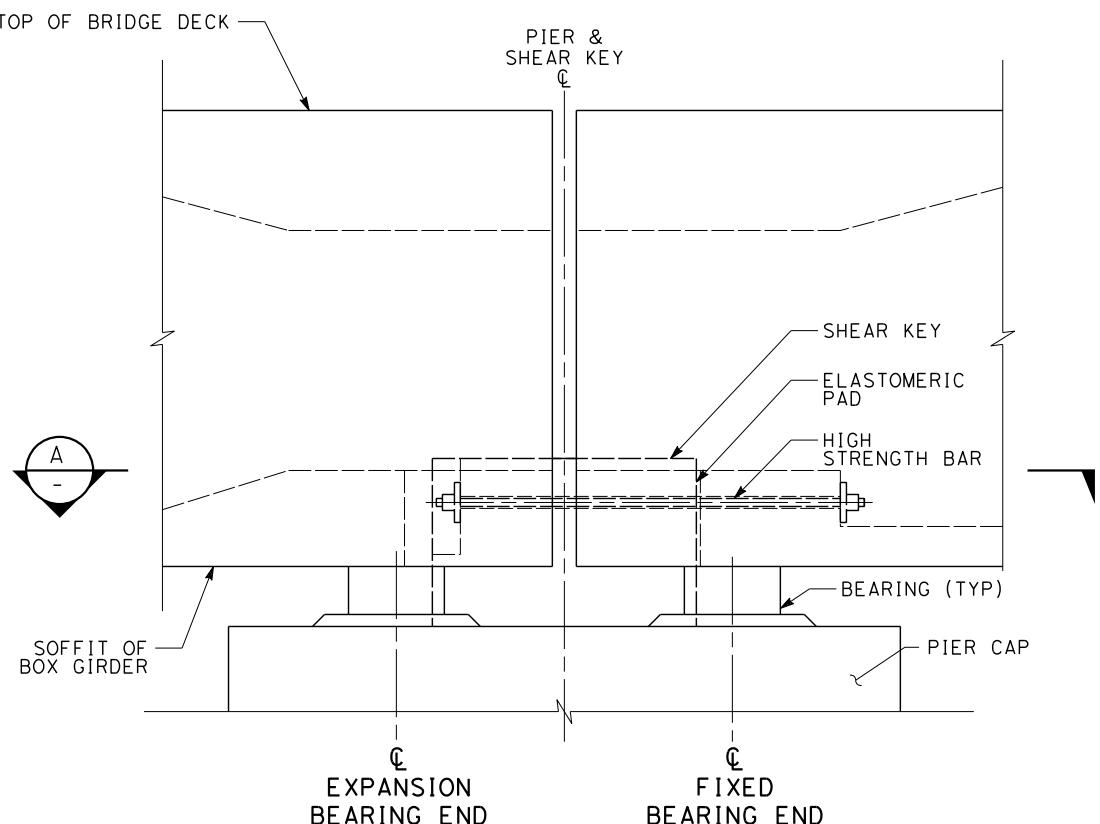
CONTRACT NO.	
DRAWING NO.	DD-ST-910
SCALE	AS SHOWN
SHEET NO.	

NOTES:

1. PARAPETS SHALL BE PROVIDED ALONG EDGES OF AERIAL STRUCTURES, BRIDGES, AND HST GRADE SEPARATIONS.
2. PARAPETS SHALL BE DESIGNED FOR WIND LOADS, SLIPSTREAM EFFECTS, AND OTHER LOADS REQUIRED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
3. PARAPETS SHALL BE DESIGNED TO ACCOMMODATE FUTURE INSTALLATION OF SOUND WALLS.
4. AT CONSTRUCTION JOINTS OF CONCRETE PARAPETS, A JOINT WITH FILLER SHALL BE PROVIDED. IN ADDITION, A PARAPET EXPANSION JOINT SHALL BE DESIGNED AND PROVIDED AT EVERY AERIAL STRUCTURE AND BRIDGE EXPANSION JOINT LOCATION. THE INSIDE FACE OF JOINT OPENING SHALL BE COVERED WITH A GALVANIZED STEEL PLATE SECURELY FASTENED TO THE INSIDE FACE OF THE PARAPET ON ONE SIDE OF THE EXPANSION JOINT WITH A LENGTH OF THREE INCHES MORE THAN THE MAXIMUM JOINT MOVEMENT LENGTH.

NOTES:

1. THE SHEAR KEY DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP A SHEAR KEY SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. BEARINGS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. BEARINGS SHALL BE ADJUSTABLE AND REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
3. THE PROCEDURES FOR BEARING REPLACEMENT, INCLUDING THE LOCATIONS OF JACKS AND THE ALLOWED JACKING FORCES SHALL BE SPECIFIED ON THE DRAWINGS.



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

PATRONS
BRINCKERHOFF

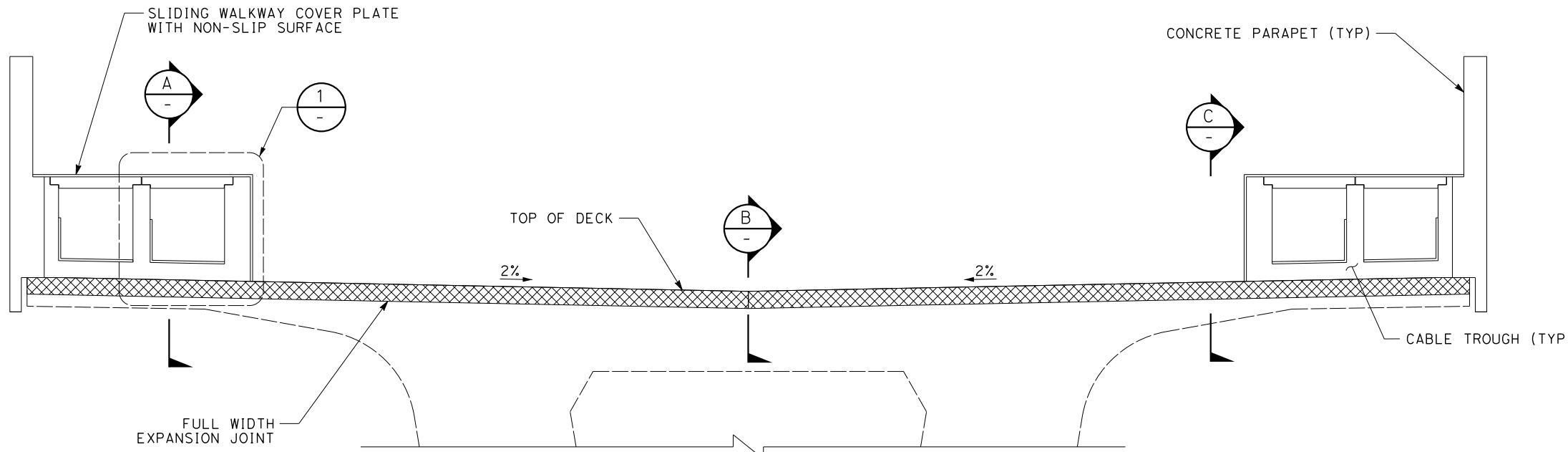

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**
AERIAL STRUCTURE
TYPICAL SPAN
SHEAR KEY DETAILS

CONTRACT NO.	
DRAWING NO.	DD-ST-911
SCALE	AS SHOWN
SHEET NO.	

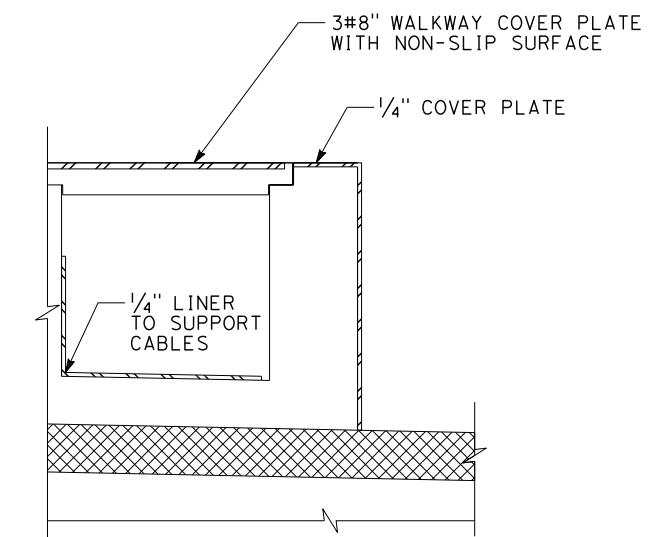
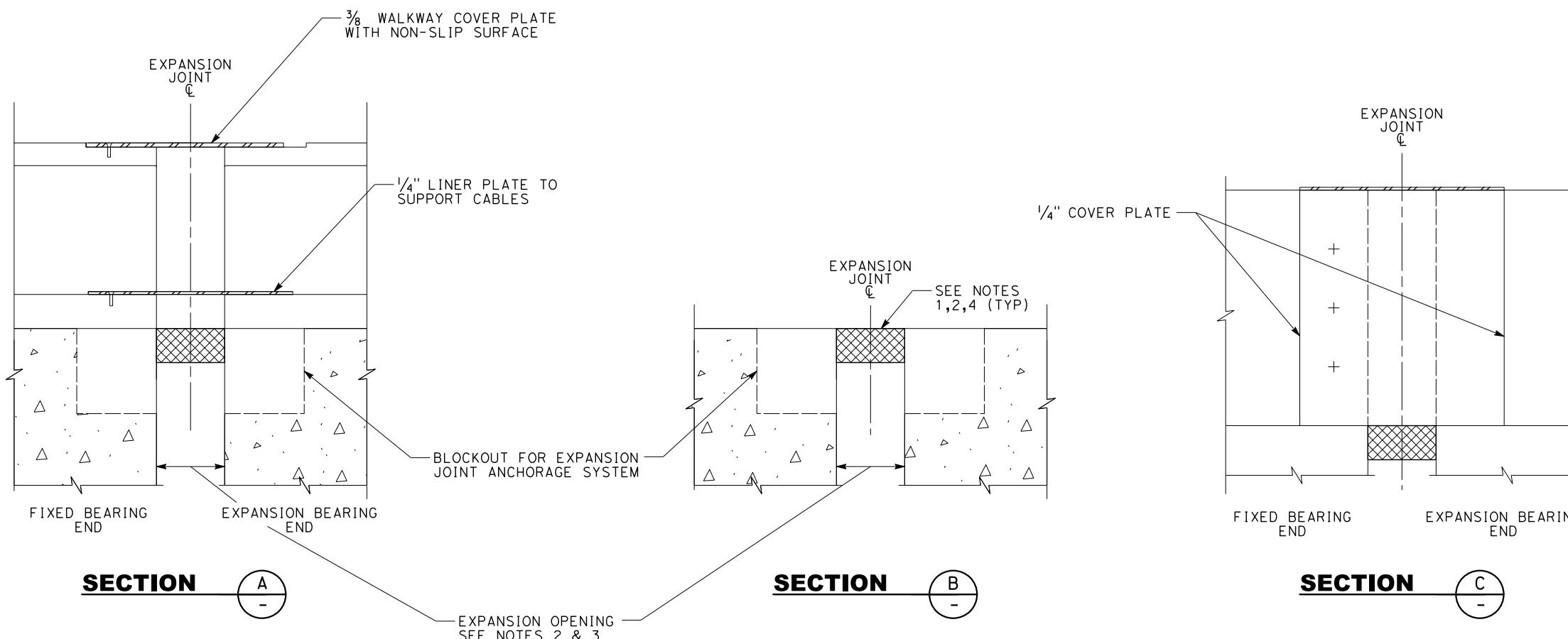


NOTES:

1. THE EXPANSION JOINT DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP AN EXPANSION JOINT SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. THE EXPANSION OPENING BETWEEN THE ENDS OF BRIDGE DECK AND ABUTMENT SHALL ACCOMMODATE THE MOVEMENT RANGE AS SPECIFIED.
3. EXPANSION JOINTS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. EXPANSION JOINTS SHALL BE REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
4. THE EXPANSION JOINT SHALL BE WATERTIGHT.
5. ALL STRUCTURAL STEEL PLATES SHALL BE GALVANIZED.



EXPANSION JOINT SECTION



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**

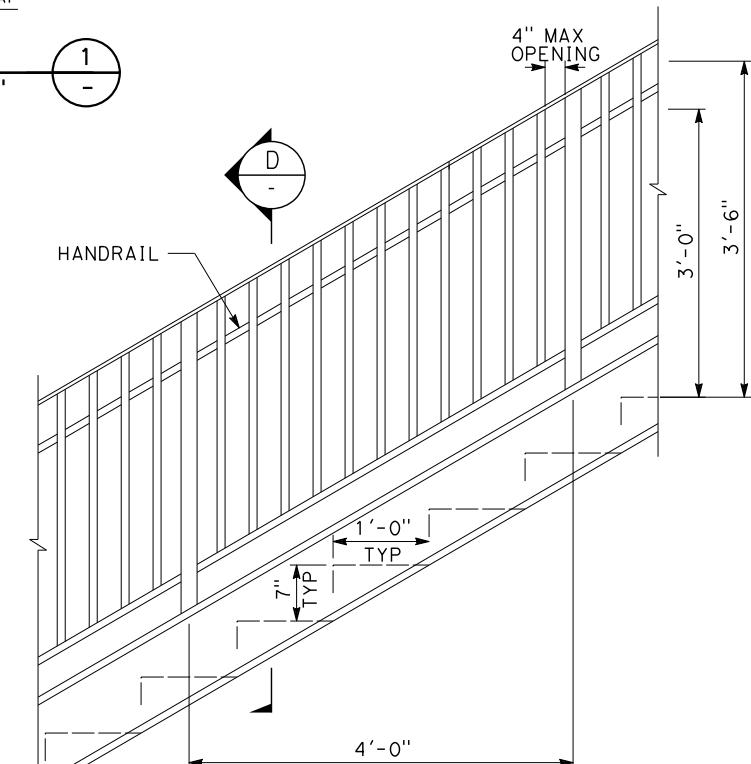
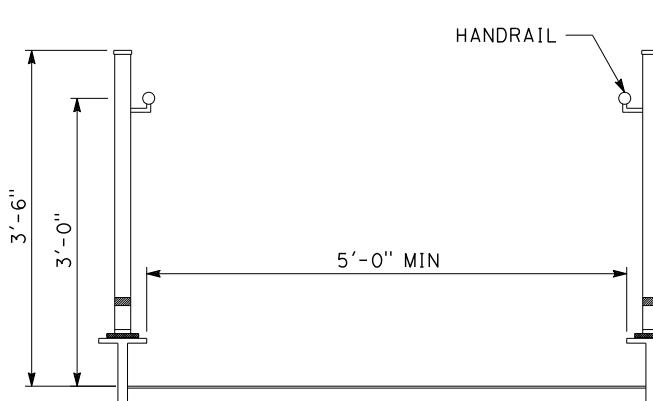
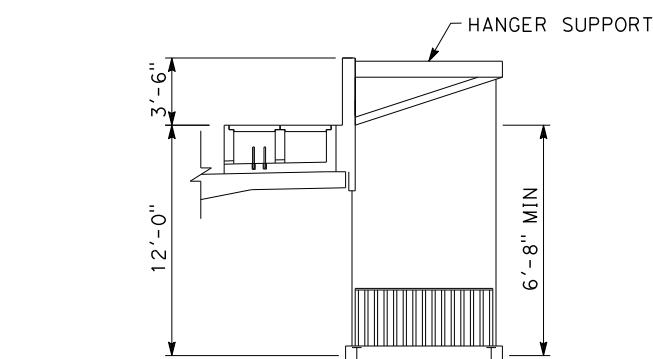
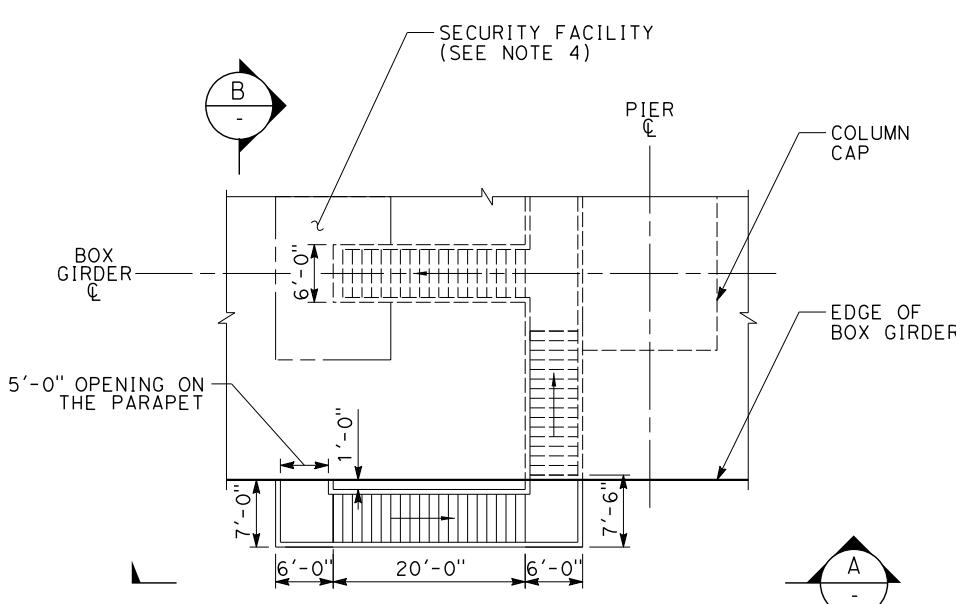
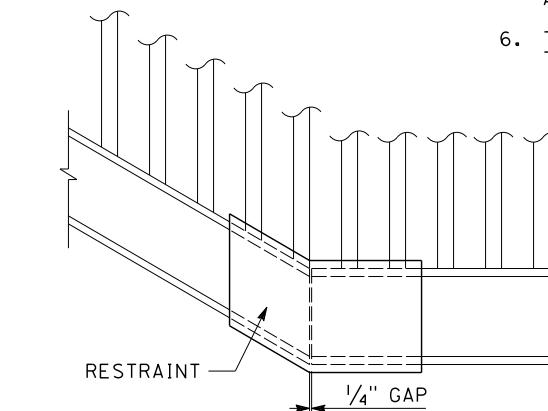
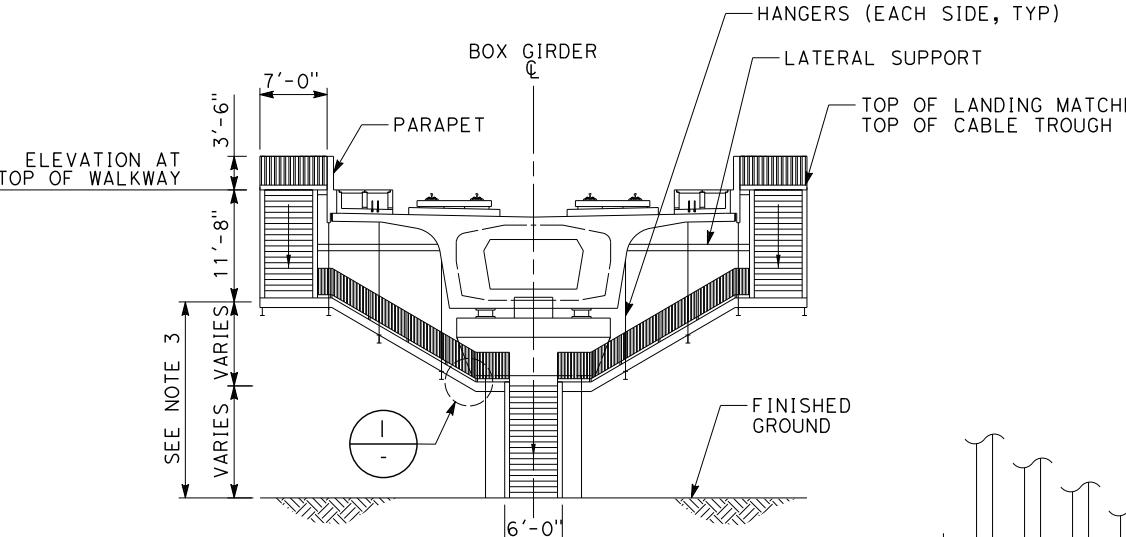
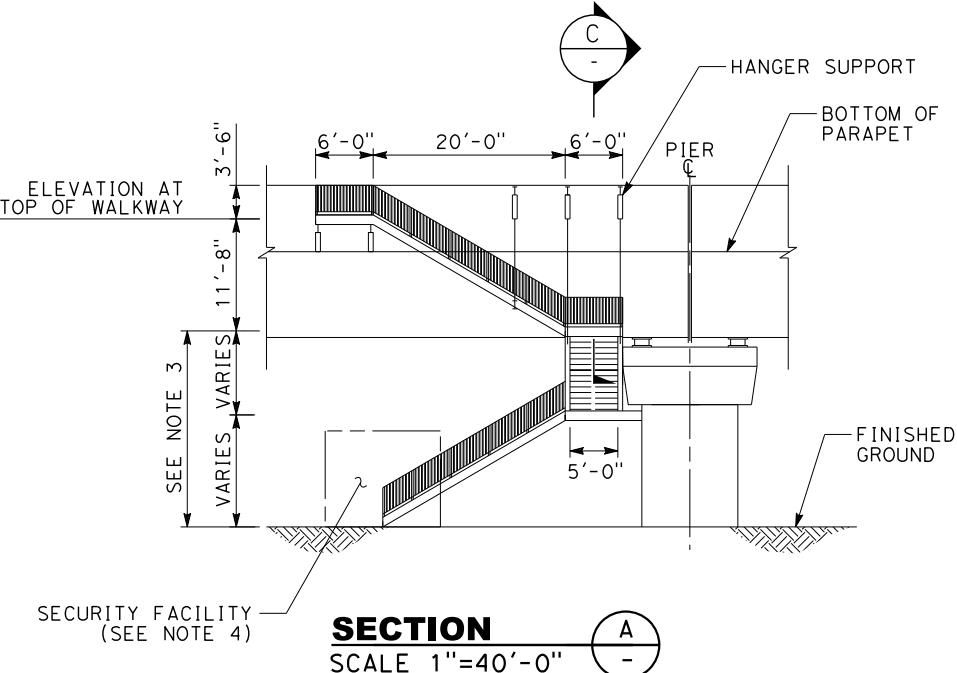


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**
AERIAL STRUCTURE
TYPICAL SPAN
EXPANSION JOINT DETAILS

CONTRACT NO.	
DRAWING NO.	DD-ST-912
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS MUST BE PROVIDED.
4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



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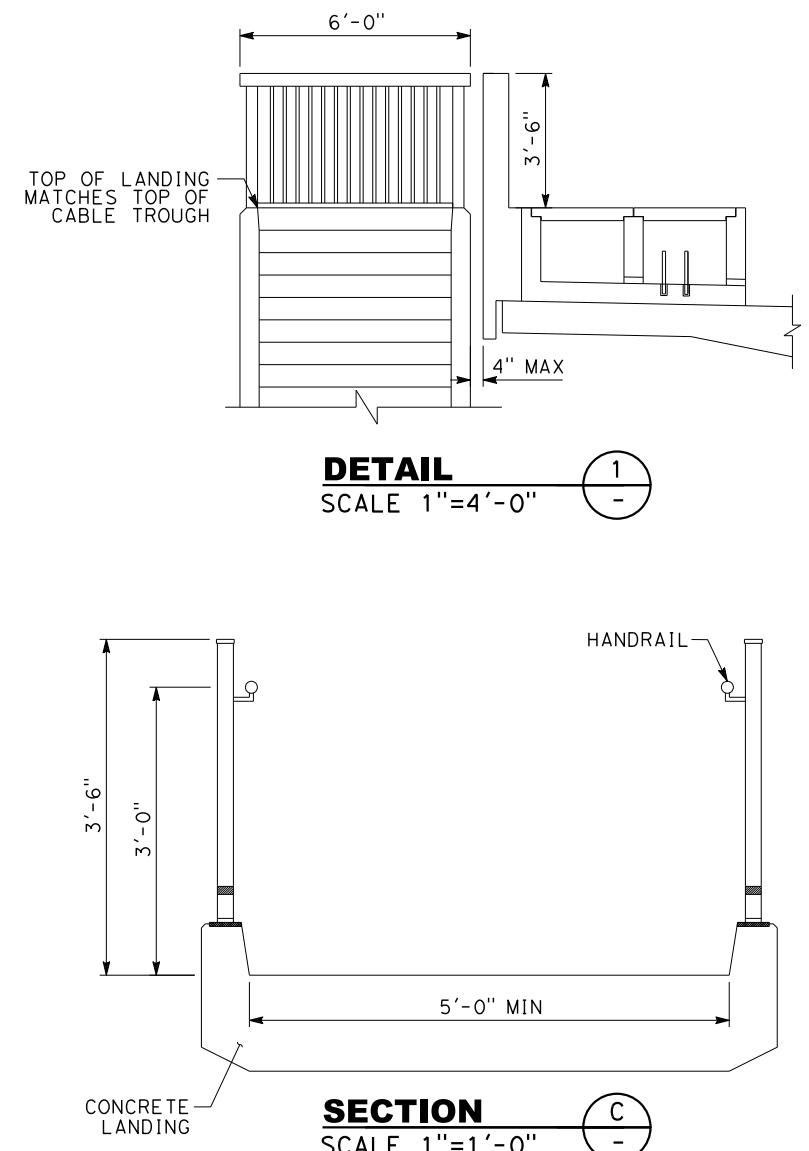
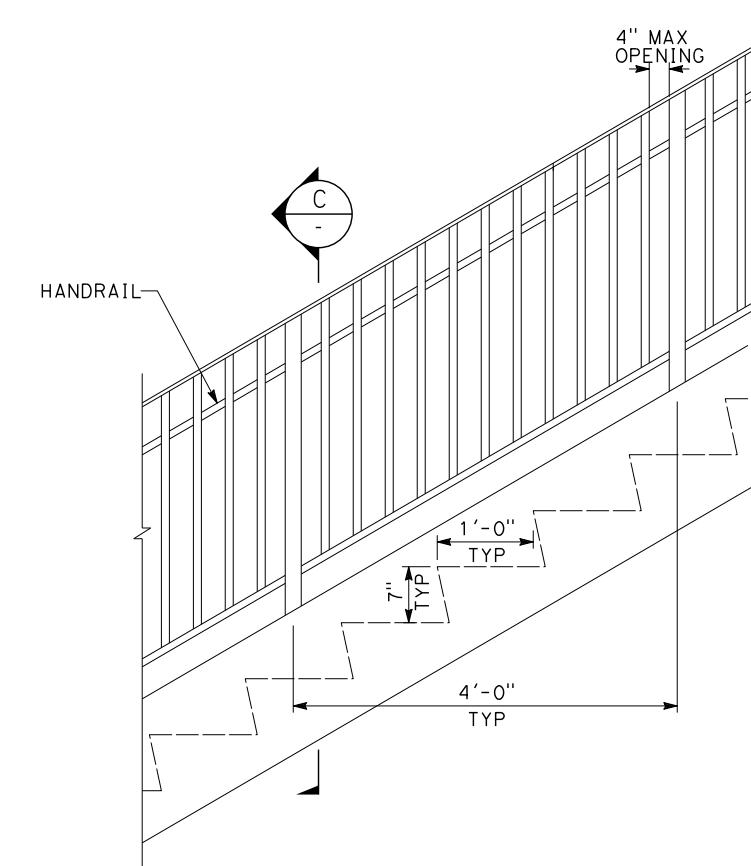
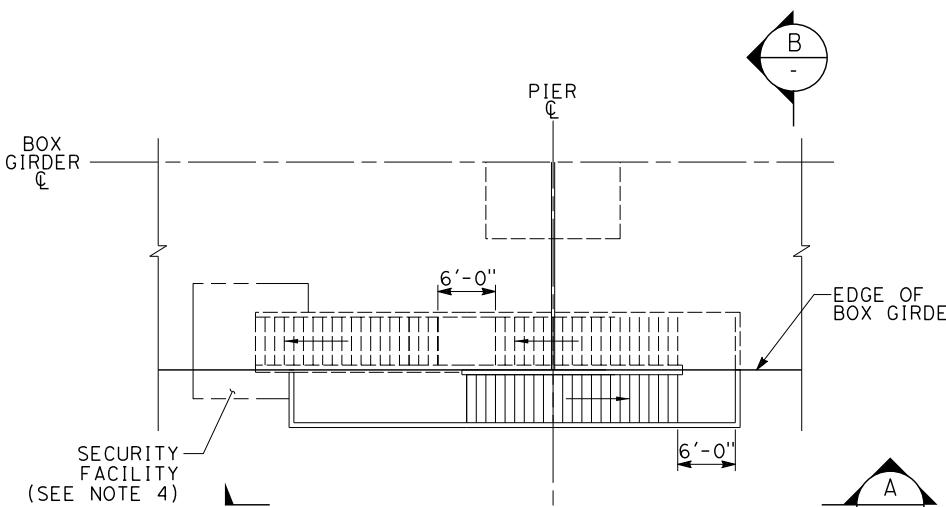
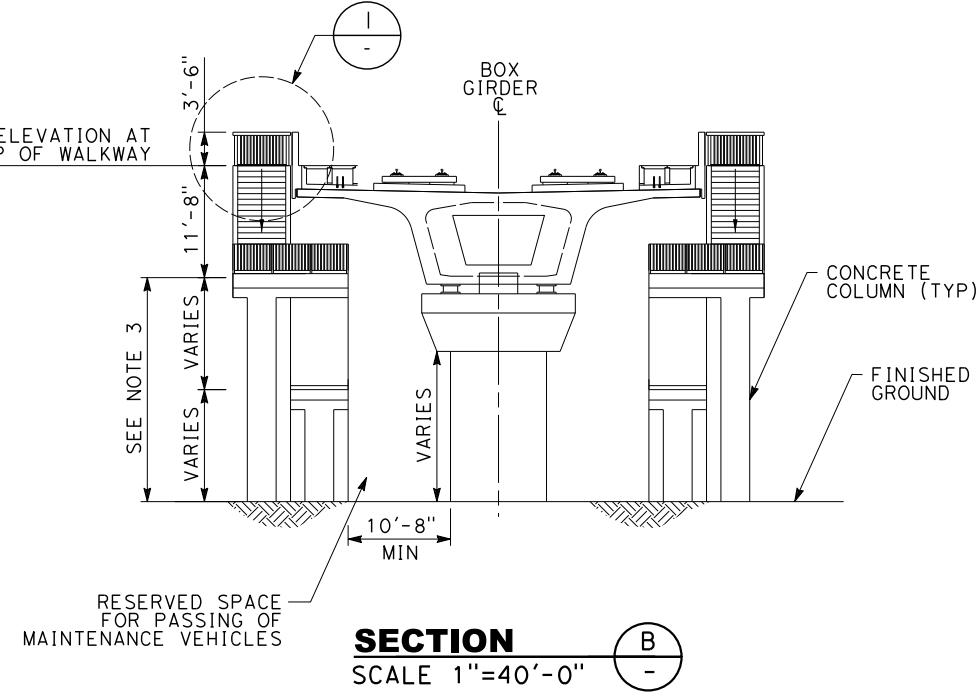
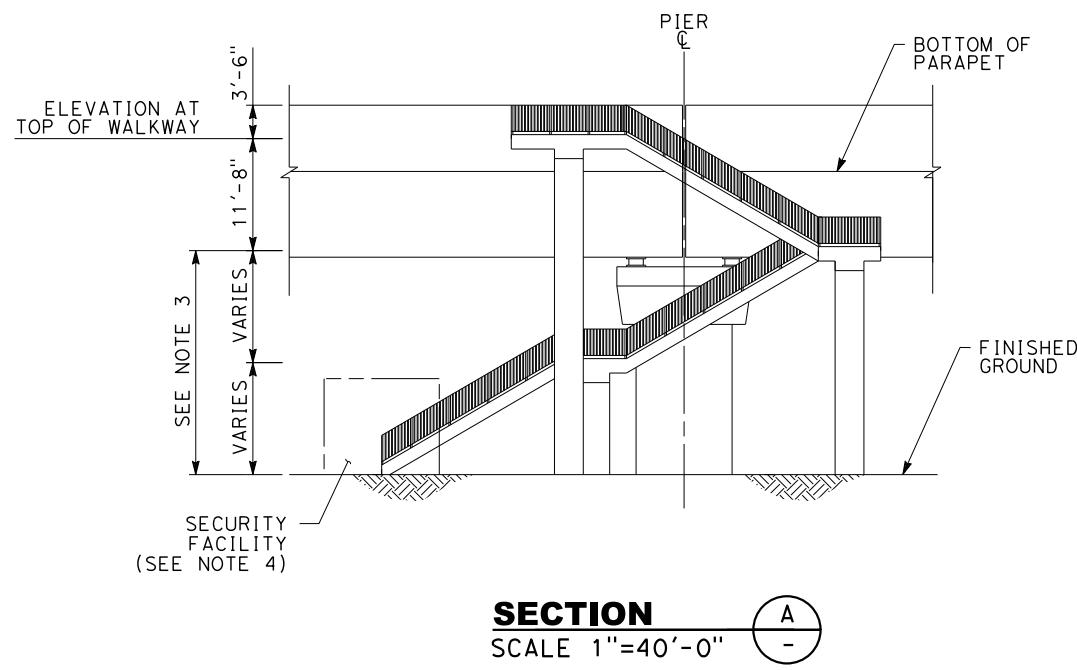
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF****CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 1

CONTRACT NO.
DRAWING NO. DD-ST-913
SCALE AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS SHALL BE PROVIDED.
4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY P. LIN	DRAWN BY V. HUANTE	CHECKED BY K. PUGASAP	IN CHARGE G. LUSHEROVICH	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



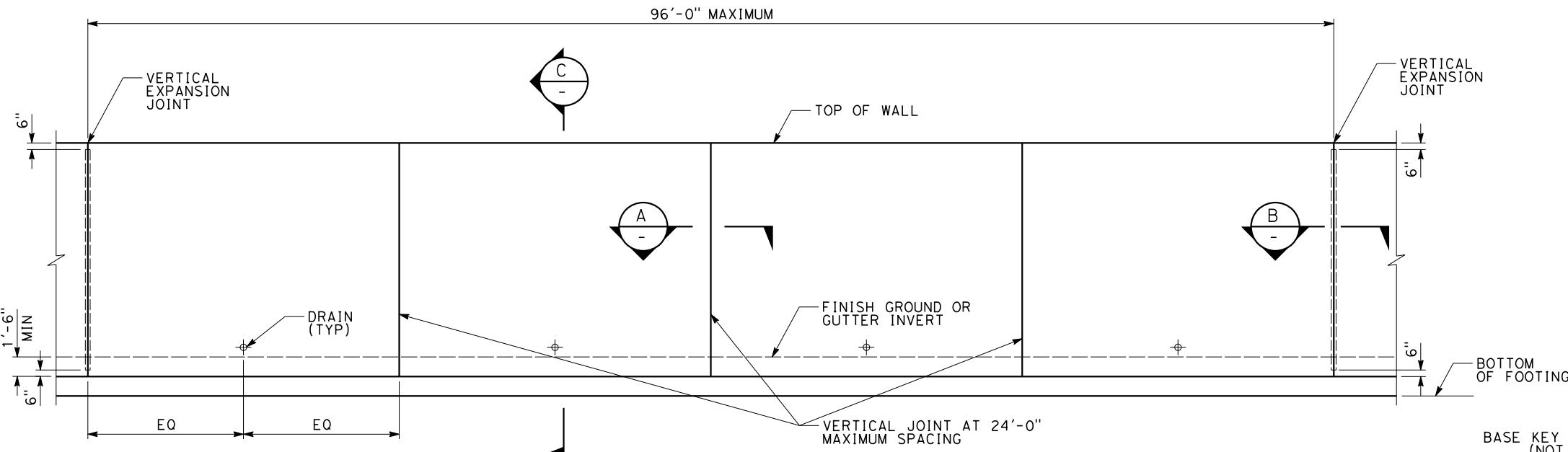
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 2

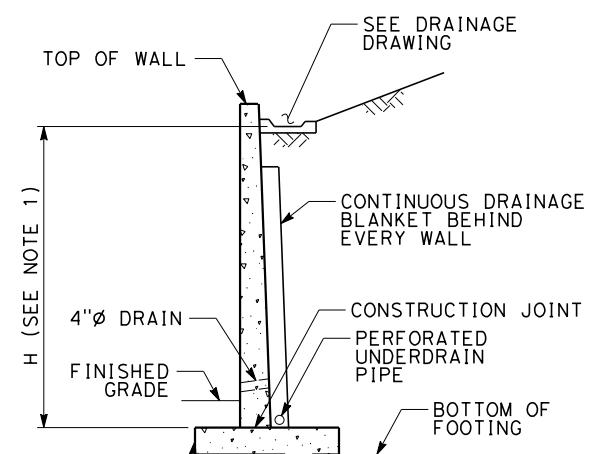
CONTRACT NO.	
DRAWING NO.	DD-ST-914
SCALE	AS SHOWN
SHEET NO.	

NOTES:

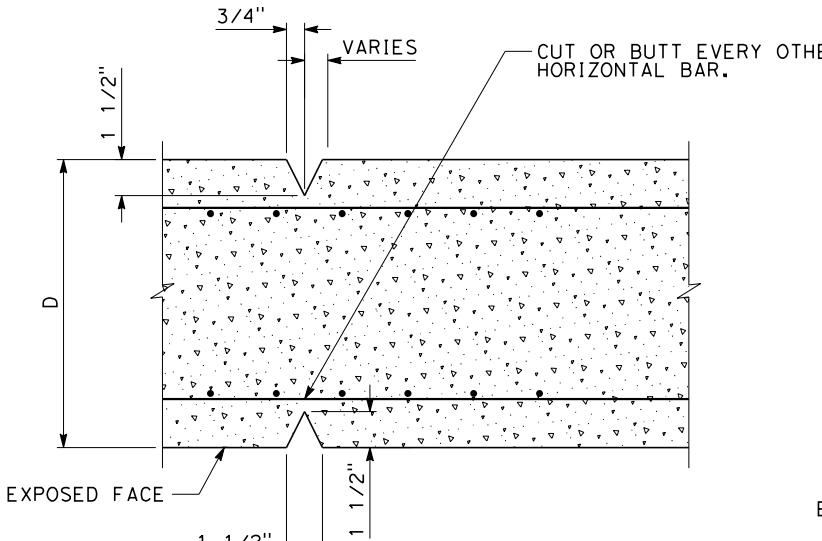
- ELEVATION OF TOP OF WALL AND BOTTOM OF FOOTING SHALL BE AS SHOWN ON OTHER CONTRACT DRAWINGS, VALUES OF H ARE DESIGN HEIGHTS ONLY.
- WALL OFFSET SHALL BE DETERMINED BY THE PROJECT STRUCTURAL ENGINEER IN CONSULTATION WITH THE PROJECT GEOTECHNICAL ENGINEER BASED ON THE CONSTRUCTION METHOD AND SEQUENCING AND IN ACCORDANCE WITH PROJECT DESIGN CRITERIA.
- WHEN A RETAINING WALL IS USED AS A CUT WALL (INCLUDING TRENCH WALLS) ALL JOINTS INCLUDING THE WEAKENED PLANE JOINTS SHALL CONTAIN A WATER STOP.



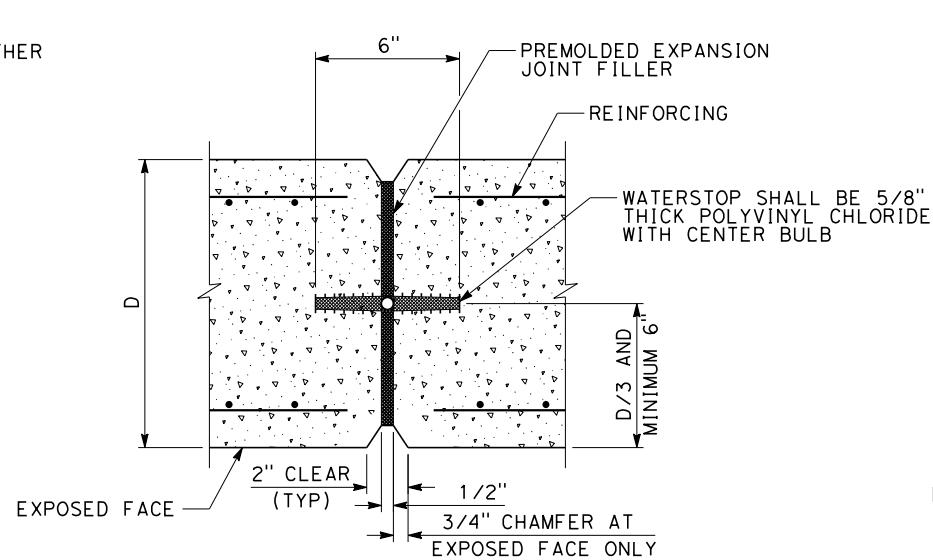
RETAINING WALL ELEVATION



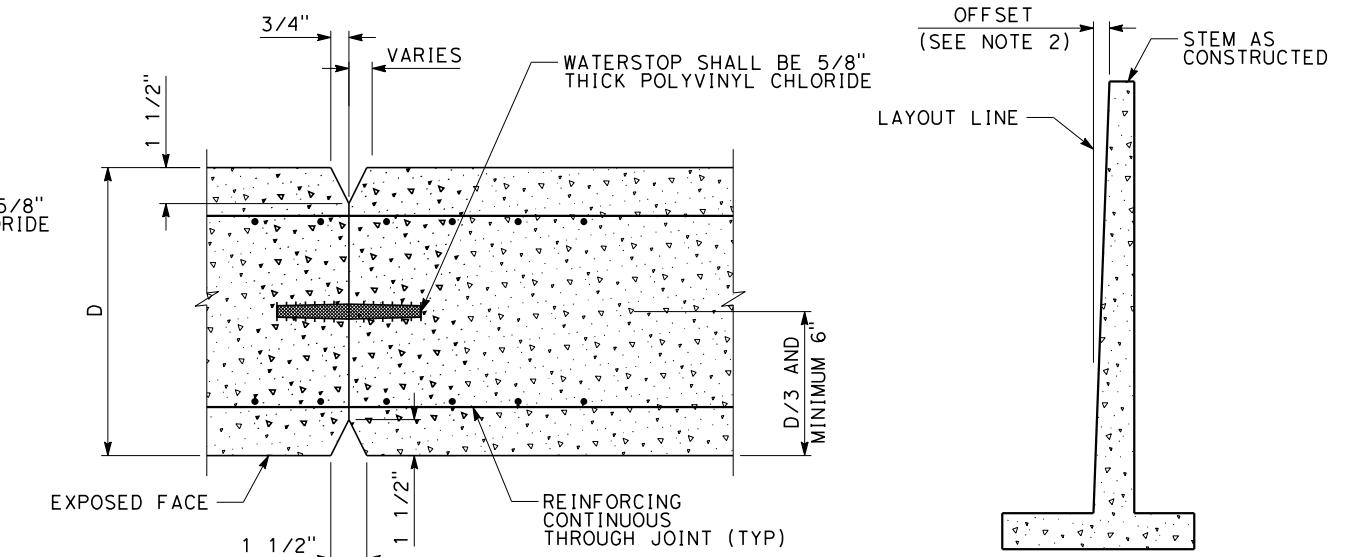
TYPICAL SECTION



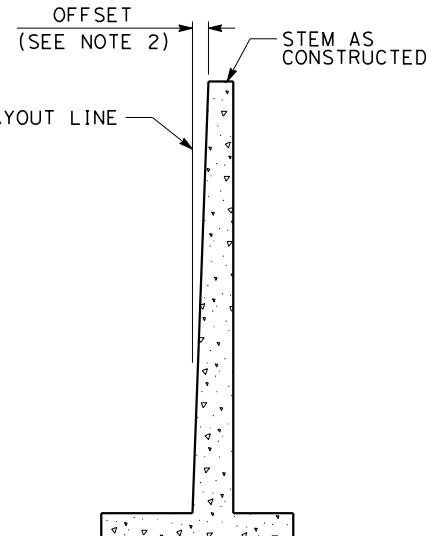
TYPICAL WEAKEND PLANE JOINT
(SEE NOTE 3)



TYPICAL EXPANSION JOINT



TYPICAL CONSTRUCTION JOINT
LOCATE AS REQUIRED TO SUITE
CONSTRUCTION SEQUENCE



WALL OFFSET VALUES

REV	DATE	BY	CHK	APP	DESCRIPTION
	08/29/2014				

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

RETAINING WALL
LAYOUT AND DETAILS

CONTRACT NO.
DRAWING NO.
DD-ST-920
SCALE
NO SCALE
SHEET NO.

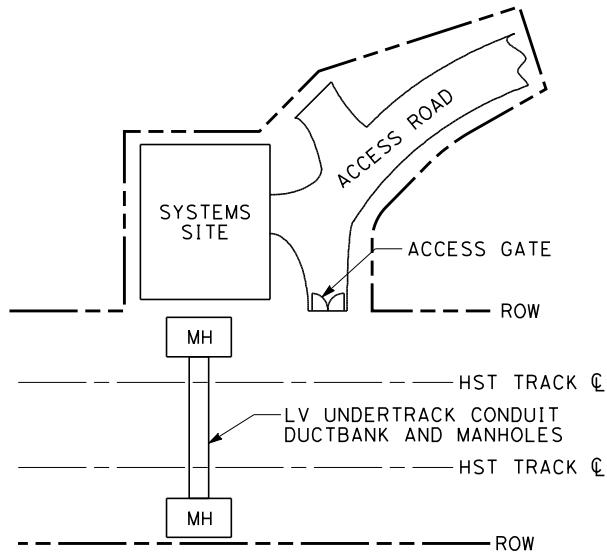


DIAGRAM A
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK, ACCESS ROADS AND
GATES AT SYSTEMS SITE

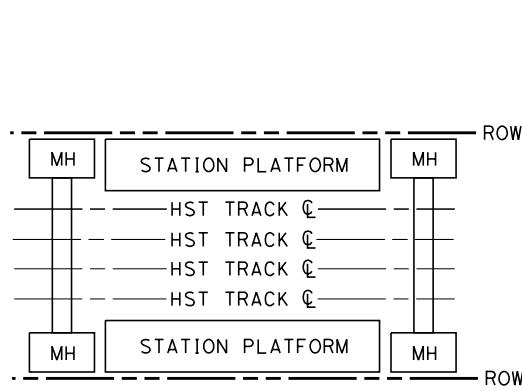


DIAGRAM B
LOW-VOLTAGE UNDERTRACK
DUCTBANK AT STATION PLATFORMS

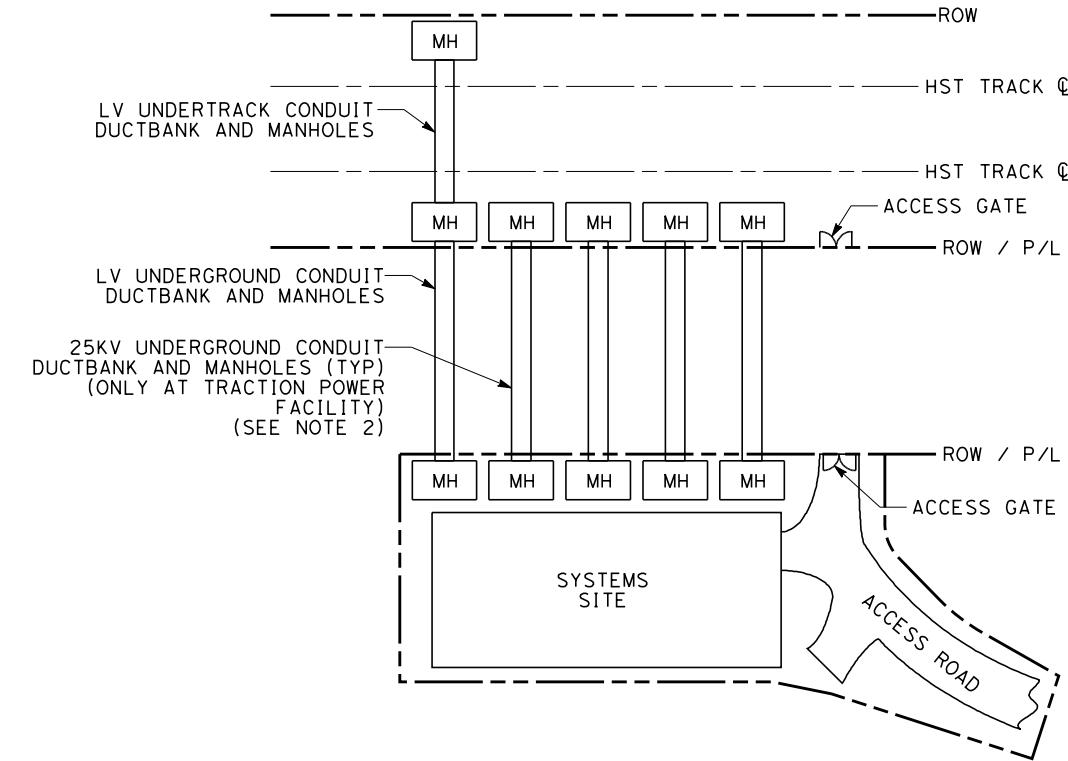


DIAGRAM C
AT-GRADE LOW-VOLTAGE UNDERTRACK AND UNDERGROUND
CONDUIT DUCT BANK, 25KV UNDERGROUND CONDUIT DUCT
BANK, ACCESS ROADS AND GATES AT SYSTEMS SITE
LOCATED AWAY FROM HSR ROW

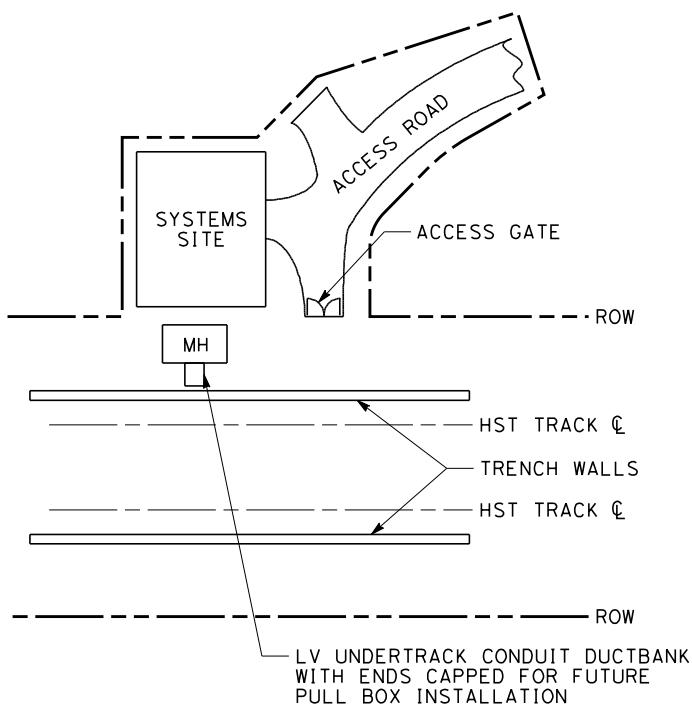


DIAGRAM D
TRENCH LOW-VOLTAGE UNDERTRACK
CONDUIT DUCT BANK AND ACCESS ROADS
AND GATES AT SYSTEMS SITE

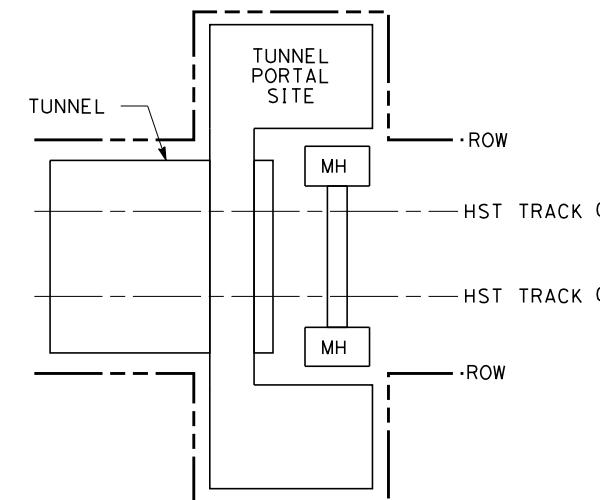


DIAGRAM E
AT-GRADE LOW-VOLTAGE
UNDERTRACK CONDUIT DUCTBANK
AT TUNNEL PORTAL SITES

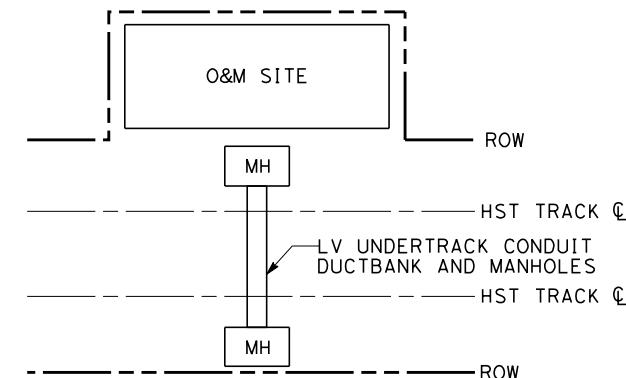


DIAGRAM F
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK AT O&M FACILITIES
UNDIVIDED

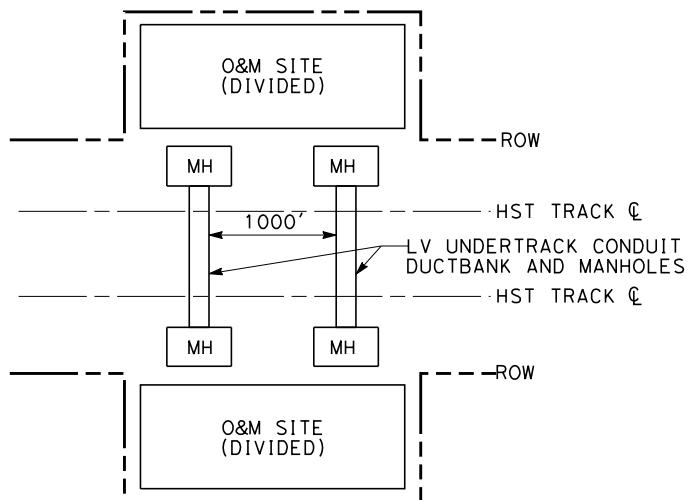


DIAGRAM G
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK AT O&M FACILITIES
DIVIDED BY MAINLINE TRACK

NOTES:

1. SYSTEM SITES INCLUDE TRACTION POWER FACILITIES, TRAIN CONTROL HOUSES, STANDALONE RADIO SITES.
2. TYPICALLY THERE ARE FOUR 25KV UNDERGROUND CONDUIT DUCTBANKS AND ACCOMPANYING MANHOLES PER TRACTION POWER SITE.
3. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. CONSULT CIVIL DESIGN CRITERIA AND PRELIMINARY DESIGN PLANS FOR REQUIREMENTS AND DETAILS.
4. SEE TRACTION POWER AND COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
5. FOR NUMBERS OF CONDUITS SEE COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
6. INTERMEDIATE MANHOLES TO BE INCLUDED BASED UPON APPLICABLE STANDARDS, REGULATIONS AND CODES.

B	TBD			POST CP01 CONFORMED SET
A	05/31/13			EXECUTION VERSION
REV	DATE	BY	CHK	APP

DESCRIPTION				
				11/19/2013

**PARSONS
BRINCKERHOFF**



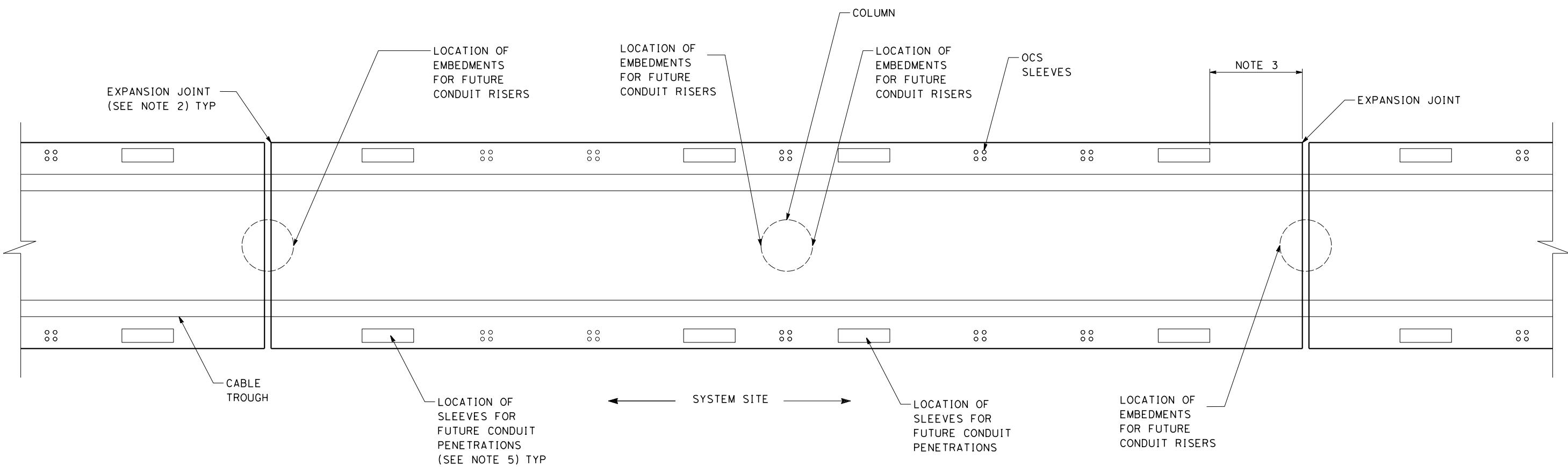
CALIFORNIA HIGH-SPEED TRAIN PROJECT SYSTEMS DIRECTIVE

TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS
AT SYSTEM SITES, STATIONS,
TUNNEL PORTAL FACILITIES AND O&M FACILITIES

CONTRACT NO.
DRAWING NO. DD-SY-010
SCALE NO SCALE
SHEET NO.

NOTES:

- STRUCTURAL DESIGN DETAILS, CABLE TROUGH AND OCS SLEEVES SHOWN HERE ARE SCHEMATIC ONLY.
- SLEEVE PENETRATION LOCATIONS SHALL BE LOCATED NOMINALLY $10\frac{5}{32}$ FROM THE EXPANSION JOINT.
- SLEEVE PENETRATION LOCATIONS FOR FUTURE CONDUIT PENETRATIONS SHALL BE PROVIDED IN LINE WITH THE OCS POLE FOUNDATIONS.
- FOR EACH SLEEVE PENETRATION, AREA SHALL BE SIZED TO HOUSE 10 TRADE SIZE 4 CONDUITS.
- FOR CONDUIT RISER EMBEDMENTS AND PENETRATIONS ON AERIAL STRUCTURE REQUIREMENTS, REFER TO STRUCTURES CHAPTER OF THE DESIGN CRITERIA. PENETRATIONS SHALL BE PLACED AT THE NEAREST 3 COLUMNS TO THE SYSTEMS SITE OR FACILITY AS SHOWN.



PLAN

REV	DATE	BY	CHK	APP	DESCRIPTION
					DESIGNED BY G. SPADAFORE DRAWN BY V. LAVERDE CHECKED BY B. MCNALLY IN CHARGE B. BANKS DATE 8/29/2014

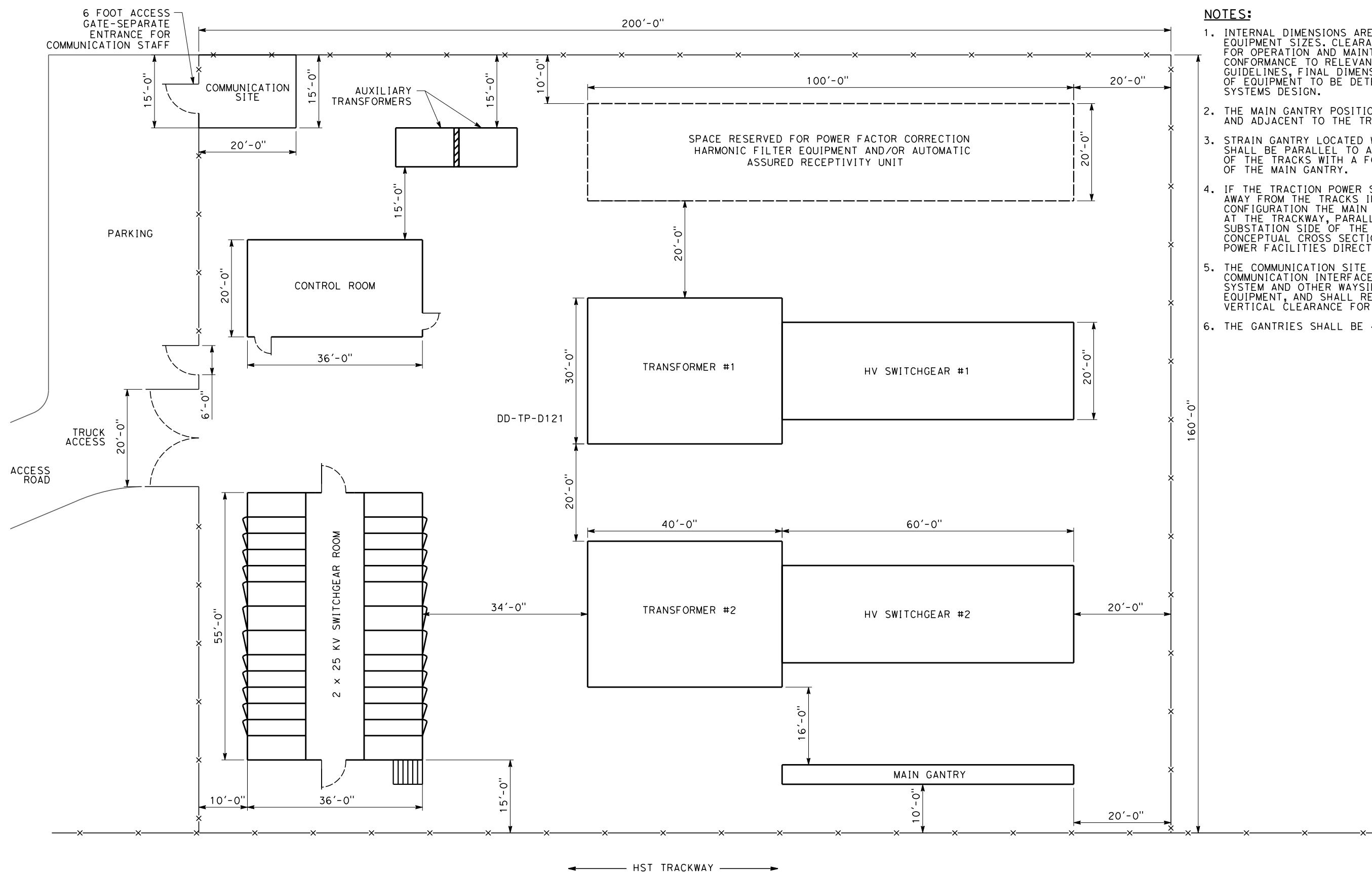
**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

SYSTEMS SITE LOCATION AT AERIAL STRUCTURE
EMBEDMENTS AND KNOCKOUTS

CONTRACT NO.
DRAWING NO.
DD-SY-030
SCALE
NO SCALE
SHEET NO.



REV	DATE	BY	CHK	APP	DESCRIPTION

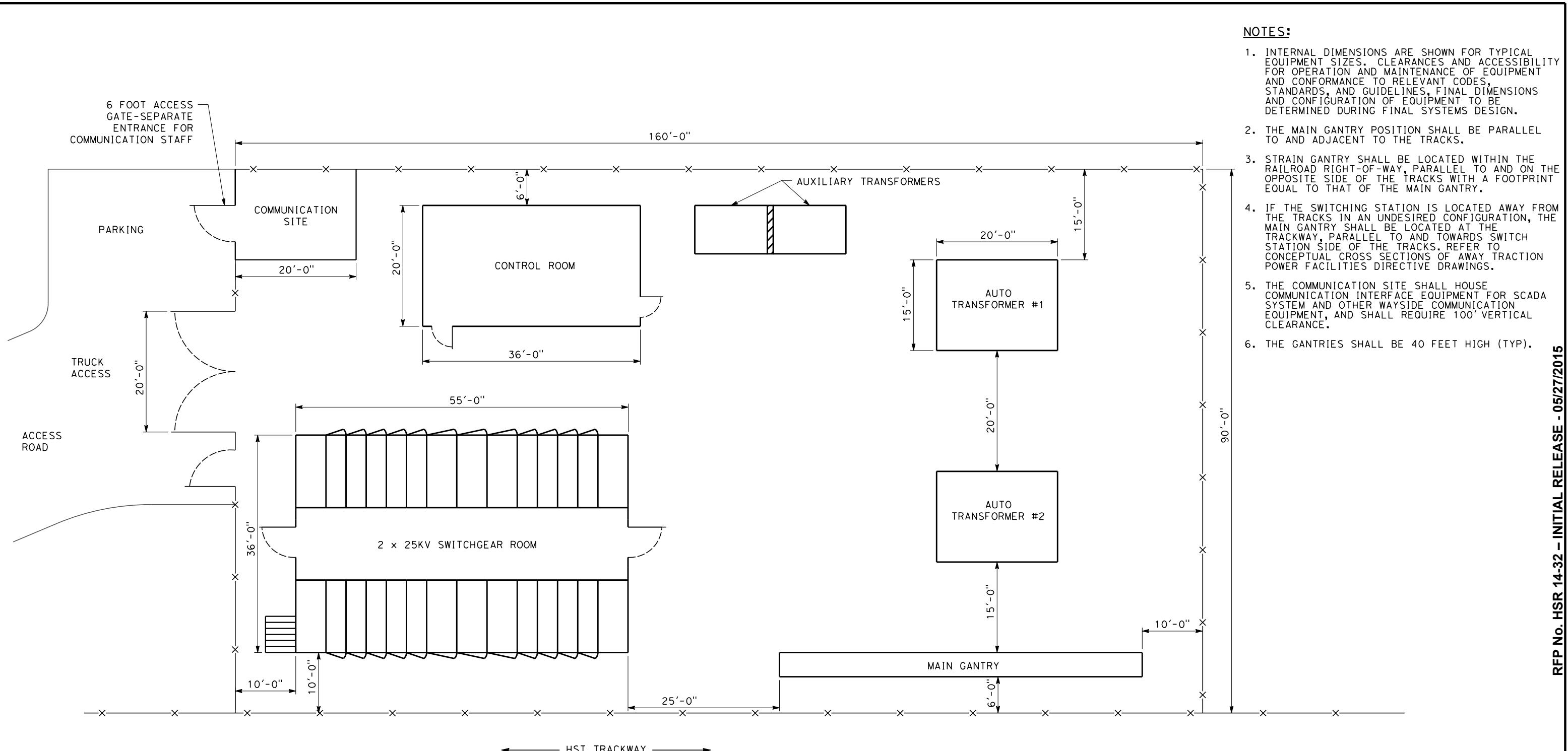
DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**
CONCEPTUAL LAYOUT
TRACTION POWER SUBSTATION
WITH TWO HIGH-VOLTAGE TRANSFORMERS

CONTRACT NO.
DRAWING NO. DD-TP-D101
SCALE NO SCALE
SHEET NO.



NOTES:

1. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
2. THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
3. STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH A FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
4. IF THE SWITCHING STATION IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRED CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS SWITCH STATION SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES DIRECTIVE DRAWINGS.
5. THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
6. THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

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Laverdev 9/30/2014 12:13:40 PM CAHSRP.tbi

**DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014**

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

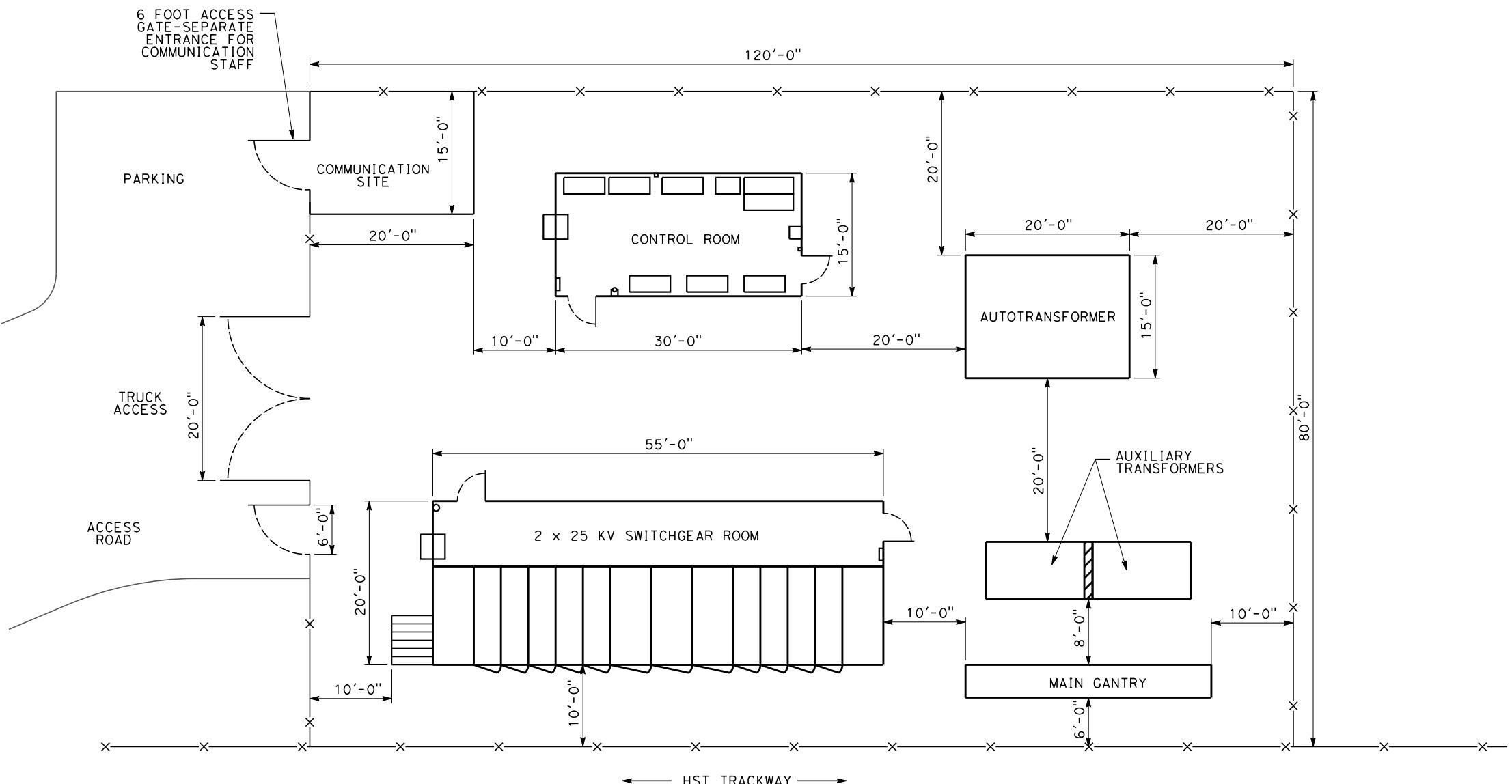
CALIFORNIA HIGH-SPEED TRAIN PROJECT TRACTION POWER DIRECTIVE

CONCEPTUAL LAYOUT SWITCHING STATION

CONTRACT NO.
DRAWING NO.
DD-TP-D201
SCALE
NO SCALE
SHEET NO.

NOTES:

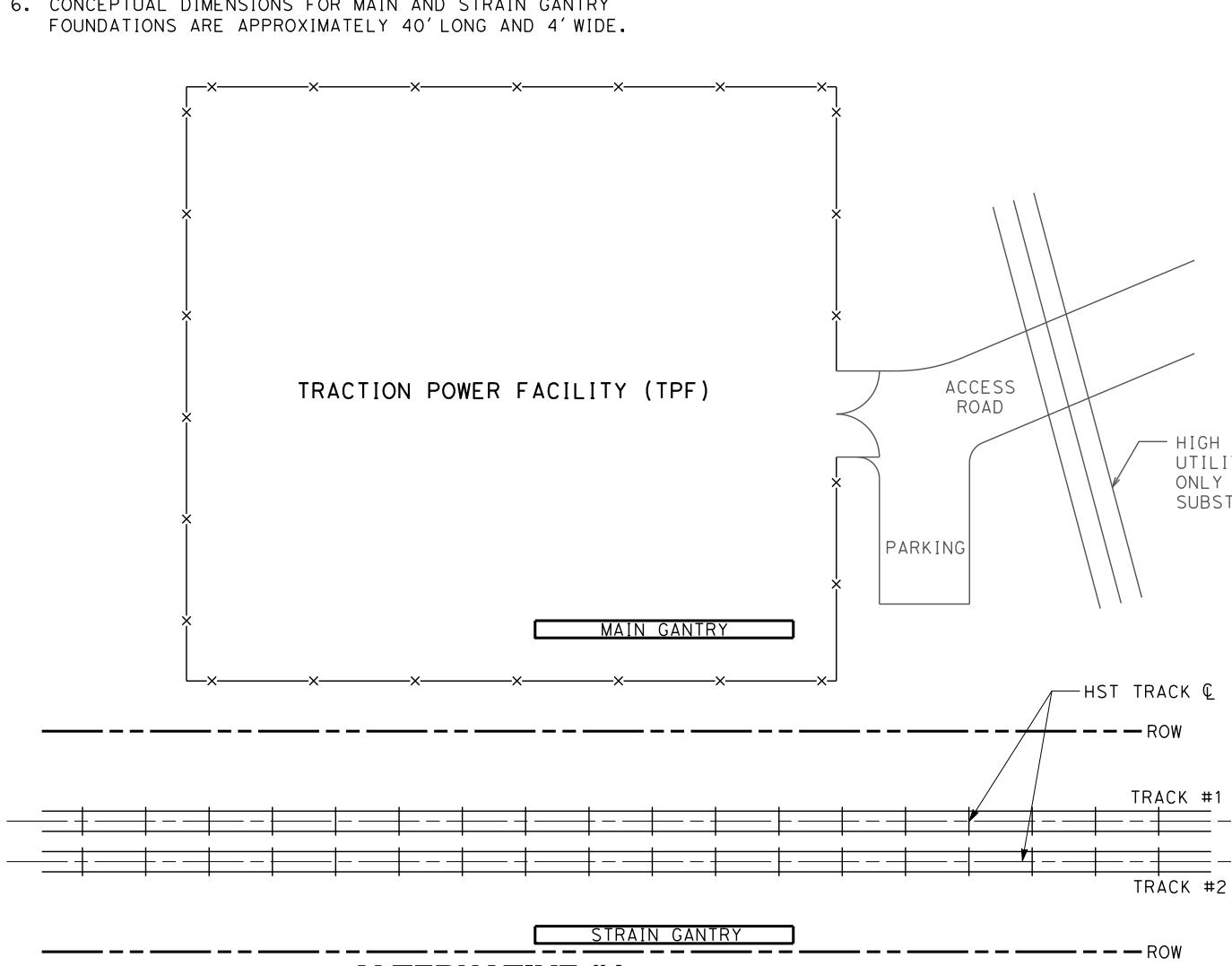
- INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
- THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
- STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
- IF THE PARALLELING STATION (PS) IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRED CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS PS SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES.
- THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
- THE GANTRIES SHALL BE 40 FEET HIGH (TYP).



NOTES:

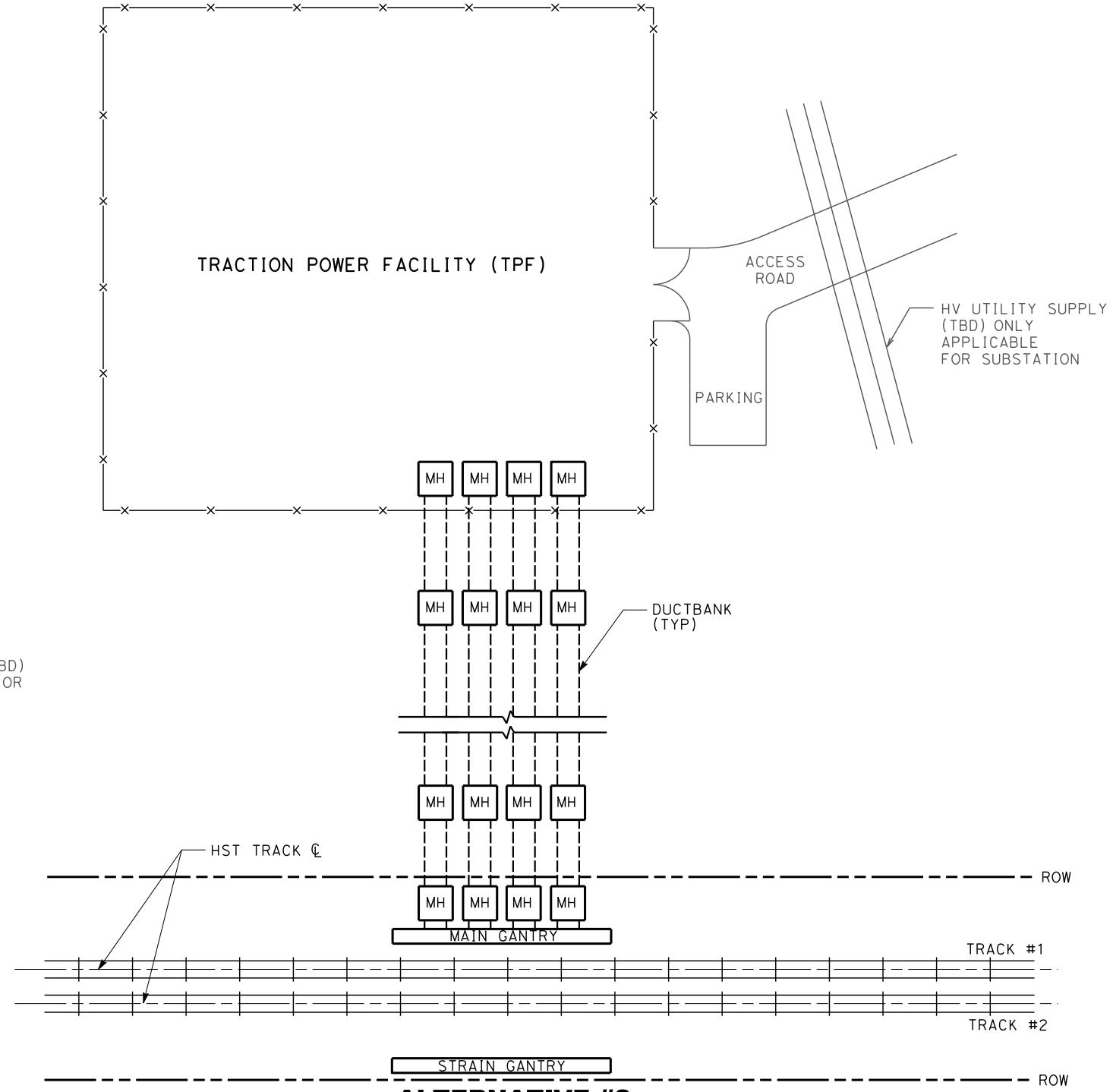
1. THIS DRAWING SHOWS GANTRY ARRANGEMENT FOR AT-GRADE CONFIGURATION FOR TWO ALTERNATIVE OPTIONS:
 - 1) TPF LOCATED ADJACENT TO TRACK ALIGNMENT;
 - 2) TPF LOCATED AWAY FROM TRACK ALIGNMENT;

ALTERNATIVE 1 IS THE PREFERRED OPTION. ALTERNATIVE 2 MAY BE USED IF ADEQUATE LAND IS NOT AVAILABLE ADJACENT TO RAILROAD ROW.
2. ALTERNATIVE 2 SHALL BE USED FOR TRACK ALIGNMENT ON AERIAL STRUCTURES. SEE "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE" DRAWING.
3. THE SPACING AND NUMBER OF MANHOLES IS INDICATIVE ONLY. ACTUAL LAYOUT WILL DEPEND UPON THE SITE CONDITIONS.
4. THE MAIN GANTRY AND THE STRAIN GANTRY SHALL BE TYPICALLY 4' WIDE AND 40' HIGH.
5. SEE "TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT" AND "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT" DIRECTIVE DRAWINGS FOR GANTRY LOCATION DETAILS.
6. CONCEPTUAL DIMENSIONS FOR MAIN AND STRAIN GANTRY FOUNDATIONS ARE APPROXIMATELY 40' LONG AND 4' WIDE.



3/30/2014 12:04:50 PM	mincio				DESIGNED BY M. PAZ	
					DRAWN BY V. HUANTE	
					CHECKED BY V. SIBAL	
					IN CHARGE B. BANKS	
					DATE 01/24/2014	
REV	DATE	BY	CHK	APP	DESCRIPTION	

**PARSONS
BRINCKERHOFF**

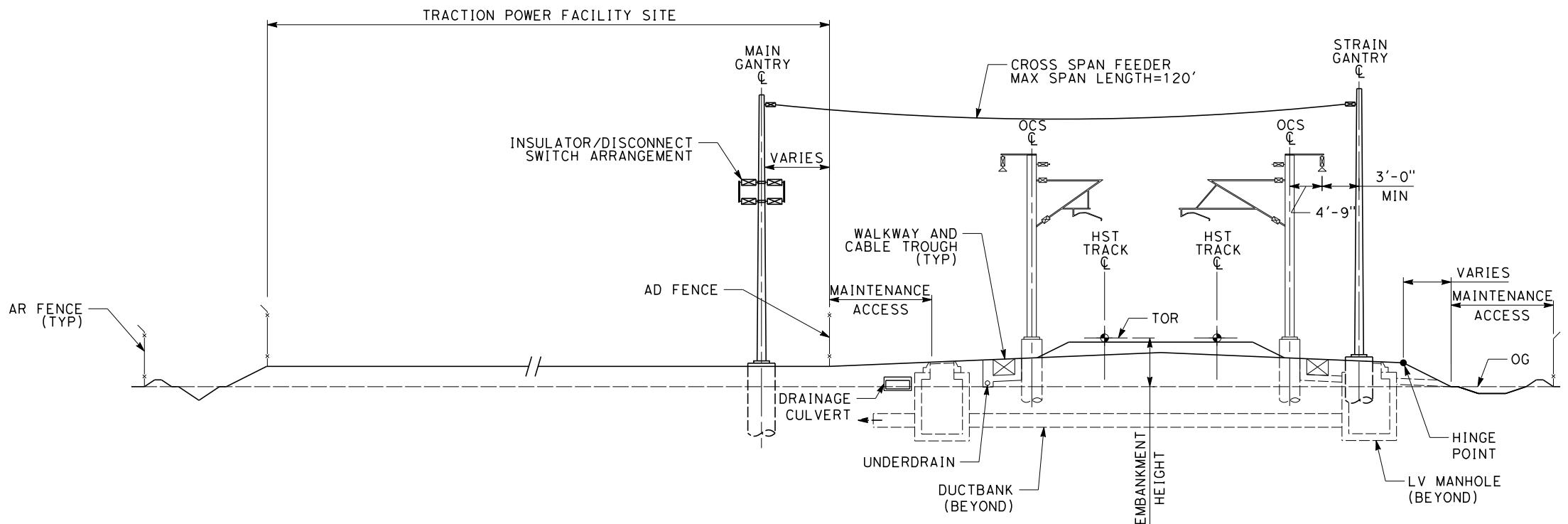


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**
CONCEPTUAL LOCATIONS OF
TRACTION POWER FACILITIES

CONTRACT NO. 13341
DRAWING NO. DD-TP-D401
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACK AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
3. DRAWING SHOWS CROSS SECTION OF TYPICAL CATENARY FEEDING ARRANGEMENT WITH TRACTION POWER FACILITY AND TRACKWAY.
4. FOR TRACTION POWER SITE REQUIREMENTS SEE TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
5. A LOW VOLTAGE UNDERTRACK DUCTBANK TERMINATING AT LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT EACH SYSTEMS SITE. SEE COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
6. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, SEE CIVIL DIRECTIVE DRAWINGS.
7. FOR SITE DRAINAGE REQUIREMENTS, SEE DRAINAGE DIRECTIVE DRAWINGS.



TYPICAL SECTION
TRACTION POWER FACILITY SITE ADJACENT TO AT-GRADE HST TRACKWAY
WITH EMBANKMENT HEIGHT (TOR-OG) \leq 10 FEET

REV	DATE	BY	CHK	APP	DESCRIPTION
					DESIGNED BY M. PAZ DRAWN BY V. LAVERDE CHECKED BY V. SIBAL IN CHARGE B. BANKS DATE 8/29/2014

**PARSONS
BRINCKERHOFF**

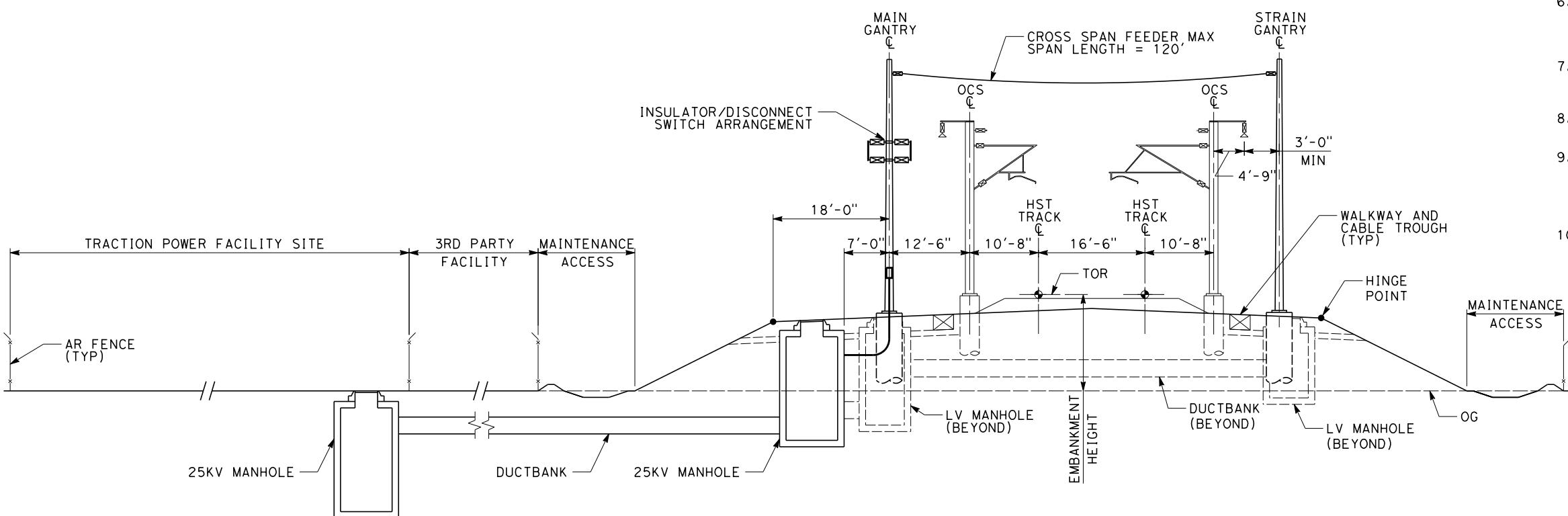


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**
TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT
TRACTION POWER FACILITY SITE
ADJACENT TO TRACKWAY

CONTRACT NO.
DRAWING NO. DD-TP-F101
SCALE NO SCALE
SHEET NO.

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
2. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA. FOR SITE REQUIREMENTS REFER TO TRACTION POWER SITE REQUIREMENTS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.
5. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANK WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
6. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
7. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
8. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
9. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
10. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

**TYPICAL SECTION**

TRACTION POWER FACILITY SITE AWAY FROM AT-GRADE HST TRACKWAY OR
EMBANKMENT HEIGHT (TOR-OG) >10 FEET

DESIGNED BY M. PAZ	
DRAWN BY V. HUANTE	
CHECKED BY V. SIBAL	
IN CHARGE B. BANKS	
DATE 8/29/2014	

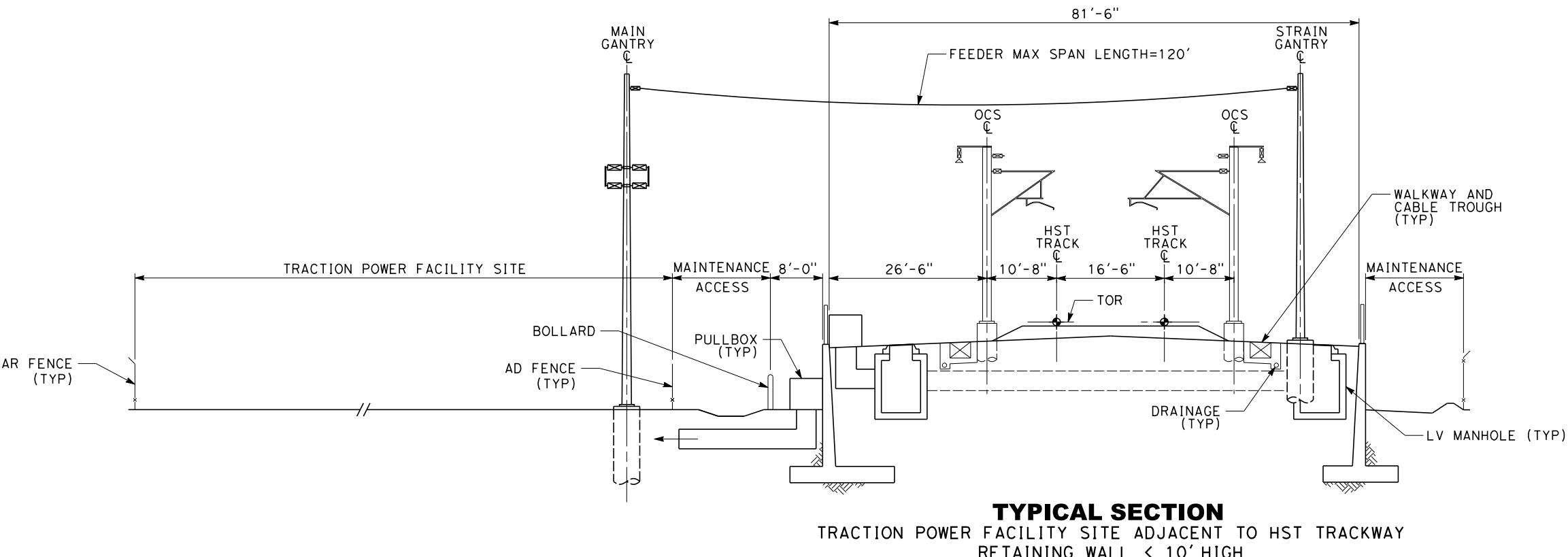
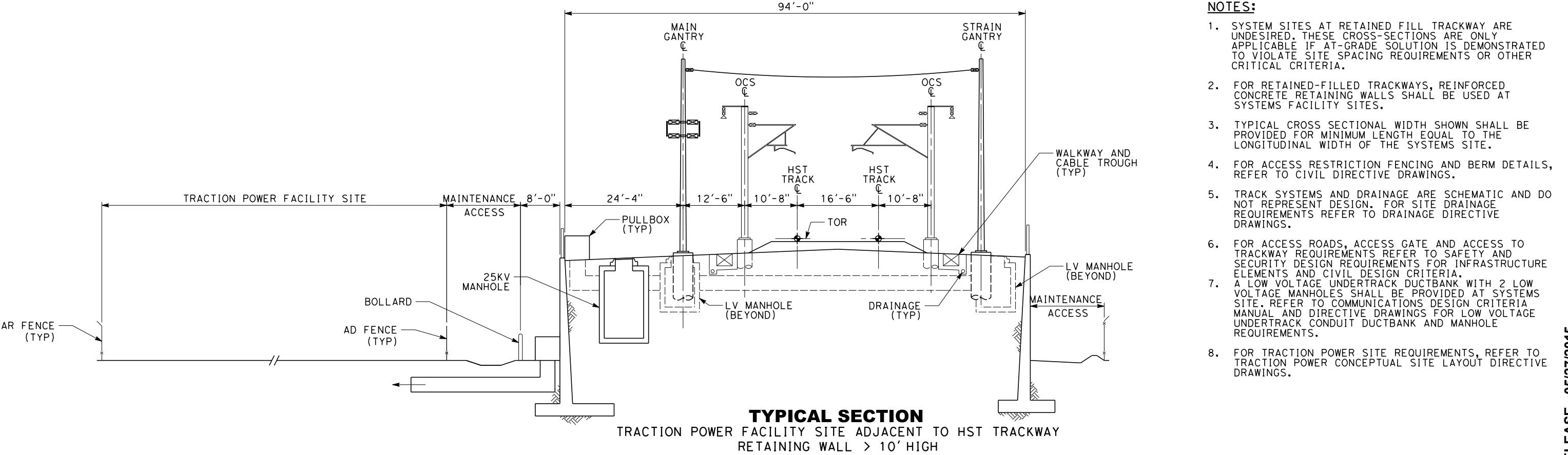
**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT
TRACTION POWER FACILITY SITE
AWAY FROM TRACKWAY

CONTRACT NO.
DRAWING NO. DD-TP-F102
SCALE NO SCALE
SHEET NO.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. PAZ
DRAWN BY V. HUANTE
CHECKED BY V. SIBAL
IN CHARGE B. BANKS
DATE 8/29/2014

**PARSONS
BRINCKERHOFF**



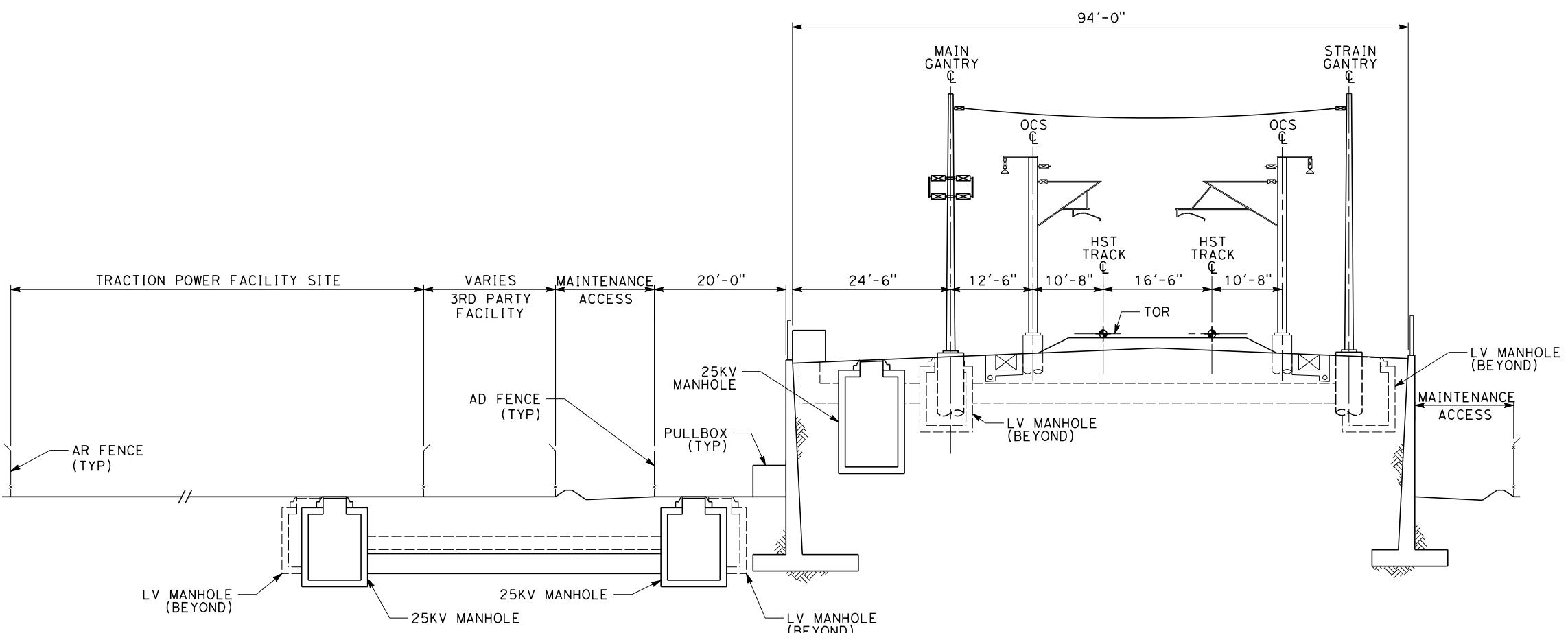
CALIFORNIA HIGH-SPEED TRAIN PROJECT TRACTION POWER DIRECTIVE

TYPICAL CATENARY FEEDING ARRANGEMENT
IN RETAINED-FILL FOR TRACTION POWER FACILITIES
ADJACENT TO TRACKWAY

CONTRACT NO.
DRAWING NO. DD-TP-F103
SCALE NO SCALE
SHEET NO.

NOTES:

1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
4. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL AND TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.
8. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANK WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
9. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
10. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
11. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
12. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
TRACTION POWER FACILITY SITE AWAY FROM RETAINED-FILL HST TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY M. PAZ	DRAWN BY V. HUANTE	CHECKED BY V. SIBAL	IN CHARGE B. BANKS	DATE 8/29/2014	CONTRACT NO.	DRAWING NO. DD-TP-F104	SCALE NO SCALE	SHEET NO.

**PATRONS
BRINCKERHOFF**

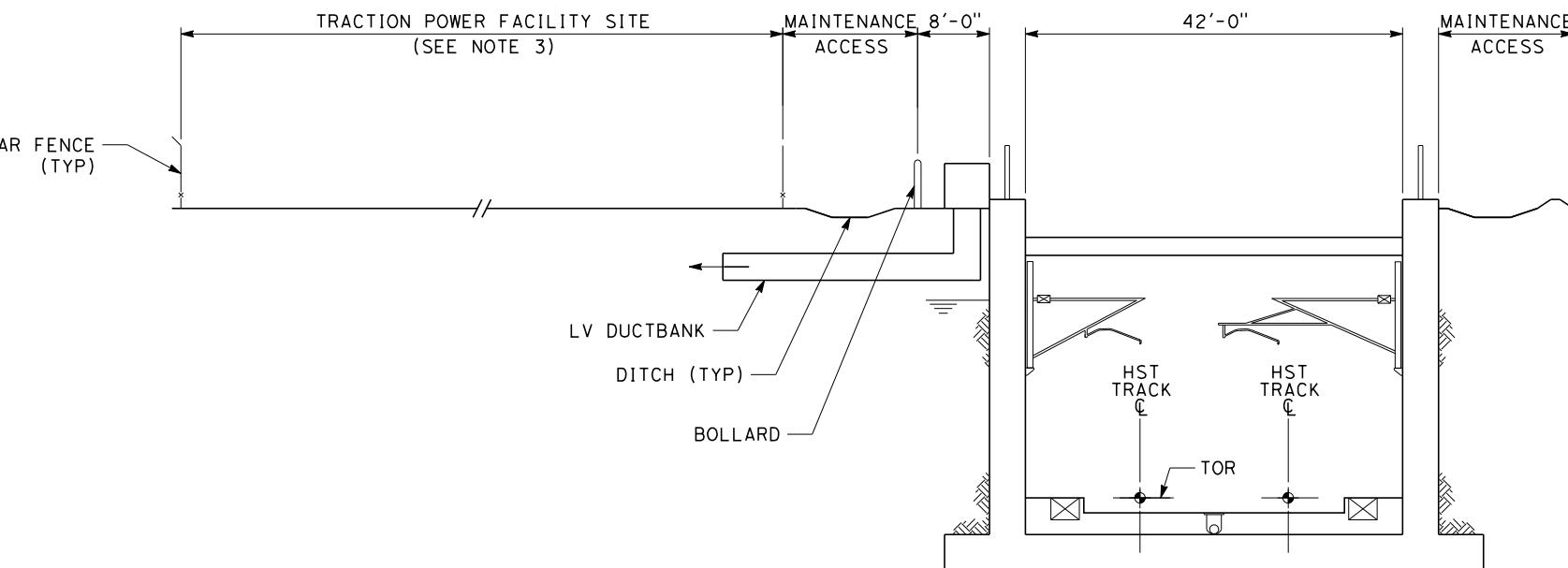


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING ARRANGEMENT
FOR TRACTION POWER FACILITIES
IN RETAINED-FILL AWAY FROM TRACKWAY

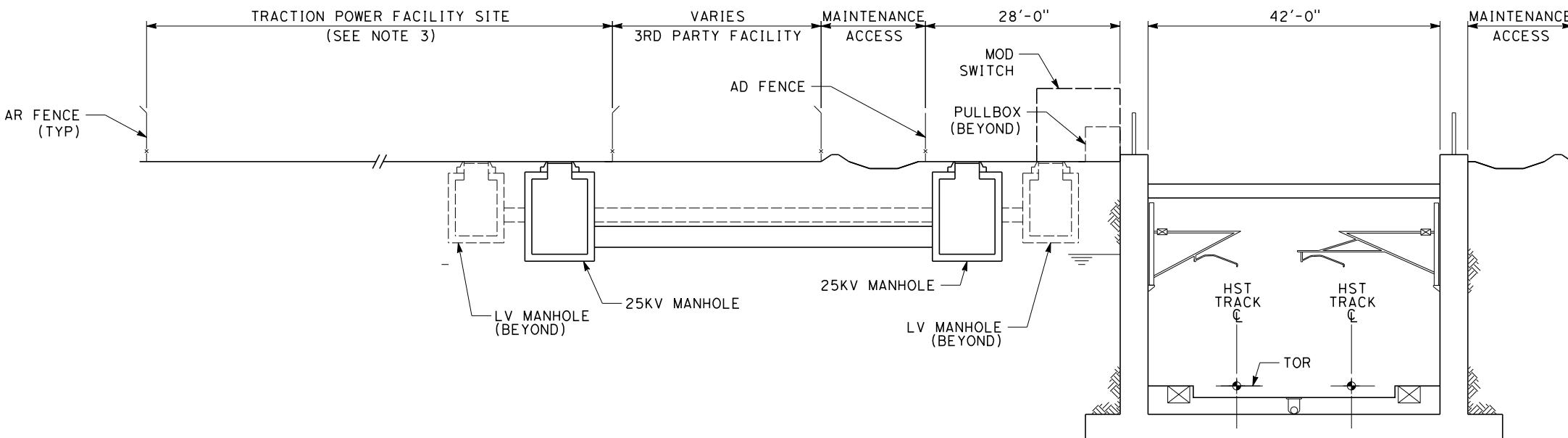
NOTES:

1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD PARTY RIGHT-OF-WAY ARE UNDESIRED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
4. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE SHALL BE PROVIDED UNDERNEATH THIRD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. FOUR ASSEMBLIES EACH CONSISTING OF 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
9. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
10. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
11. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION

TRACTION POWER FACILITY SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION

TRACTION POWER FACILITY SITE AWAY FROM TRENCH HST TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY M. PAZ	DRAWN BY V. HUANTE	CHECKED BY V. SIBAL	IN CHARGE B. BANKS	DATE 8/29/2014

**PARSONS
BRINCKERHOFF**

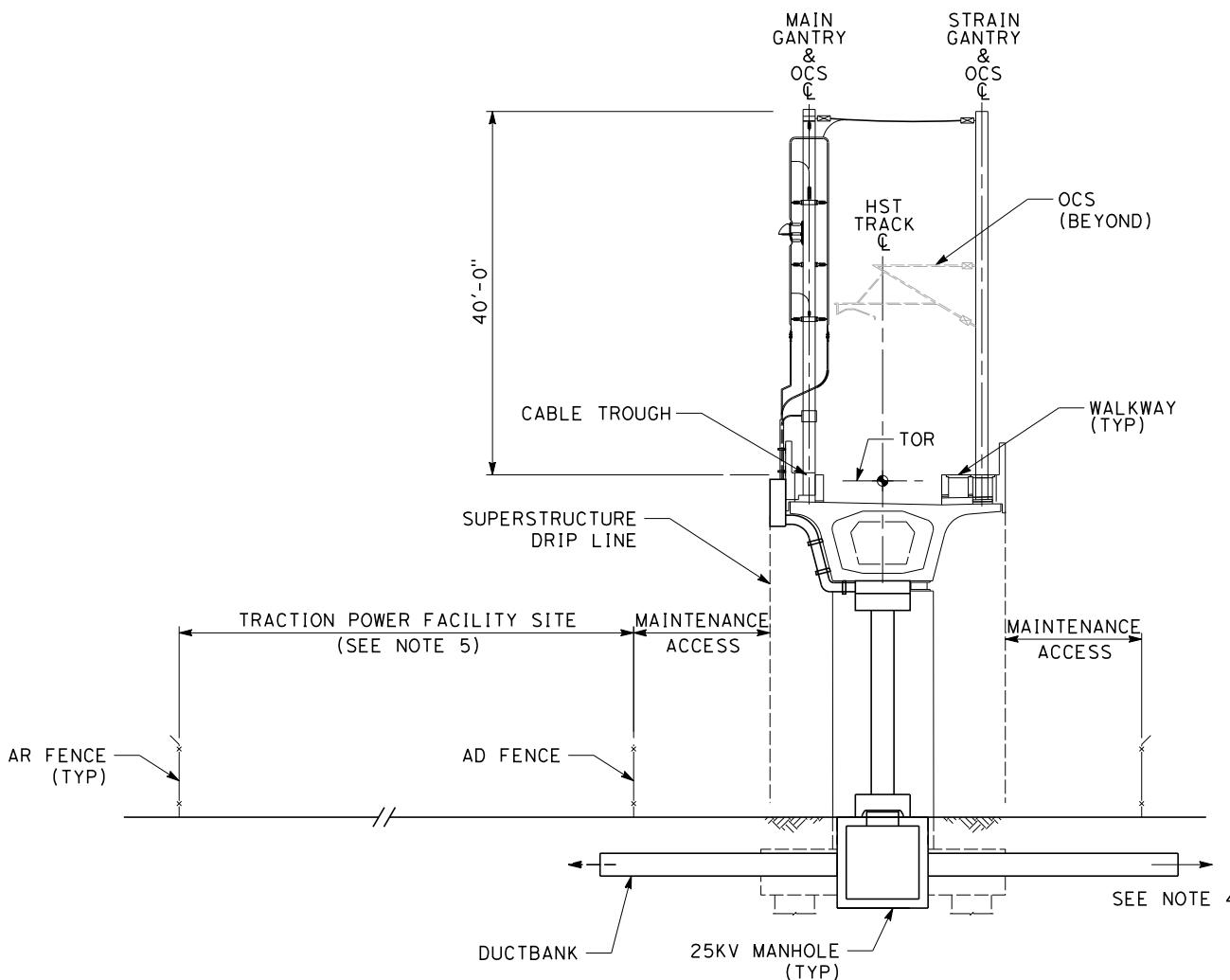


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**
SYSTEMS SITE
TRACTION POWER FACILITY
TRENCH

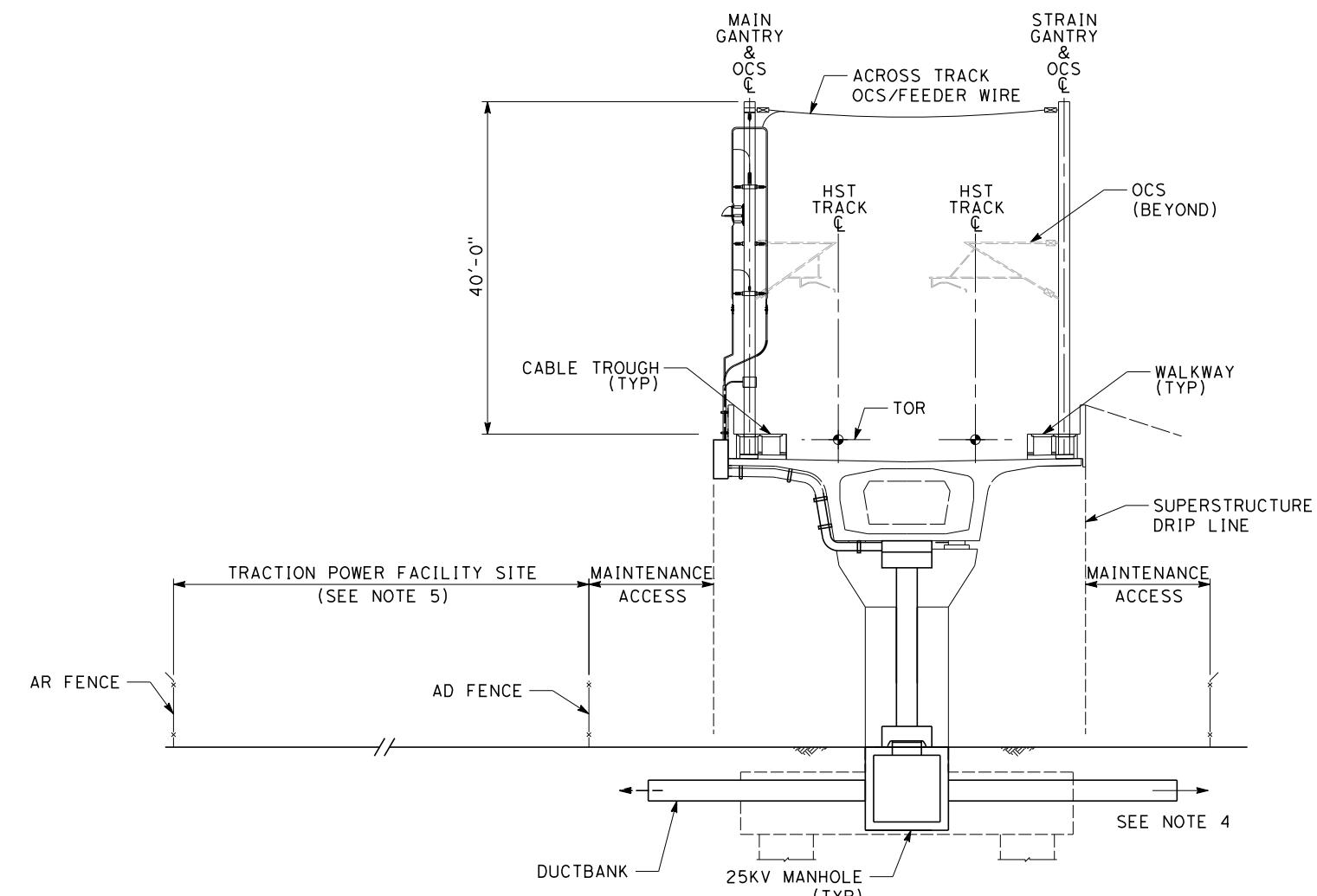
CONTRACT NO.
DRAWING NO. DD-TP-F105
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACTION POWER FACILITY SITES ALONG 2 TRACK OR SINGLE TRACK AERIAL TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA. ADDITIONAL DUCTBANKS AND MANHOLES REQUIRED BETWEEN SINGLE TRACK AERIAL STRUCTURES AND BETWEEN TRACTION POWER FACILITY SITE AND AERIAL TRACKWAY(S).
2. DRAWING SHOWS CROSS SECTION OF TYPICAL CATENARY FEEDING ARRANGEMENT AT TRACTION POWER FACILITY AND TRACKWAY TYPICAL GANTRY FEEDING ARRANGEMENT ON AERIAL STRUCTURES AT TRACTION POWER FACILITY LOCATIONS SHOWN. HIGH VOLTAGE CABLING ROUTED OUTSIDE OF STRUCTURE.
3. THE GANTRIES WILL BE LOCATED ON THE AERIAL STRUCTURES ALONG THE ALIGNMENT AND BETWEEN ADJACENT OCS POLES.
4. TRACTION POWER FACILITY SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD PARTY RIGHT-OF-WAY ARE NOT DESIRABLE. SUCH A CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE SHALL BE PROVIDED UNDERNEATH THIRD PARTY RIGHT-OF-WAY.
7. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANK WITH 2 25KV MANHOLES, SHALL BE PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
9. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
10. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
11. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
TRACTION POWER FACILITY SITE AT SINGLE-TRACK AERIAL TRACKWAY



TYPICAL SECTION
TRACTION POWER FACILITY SITE AT TWO-TRACK AERIAL TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. PAZ	
DRAWN BY V. HUANTE	
CHECKED BY V. SIBAL	
IN CHARGE B. BANKS	
DATE 8/29/2014	

**PARSONS
BRINCKERHOFF**



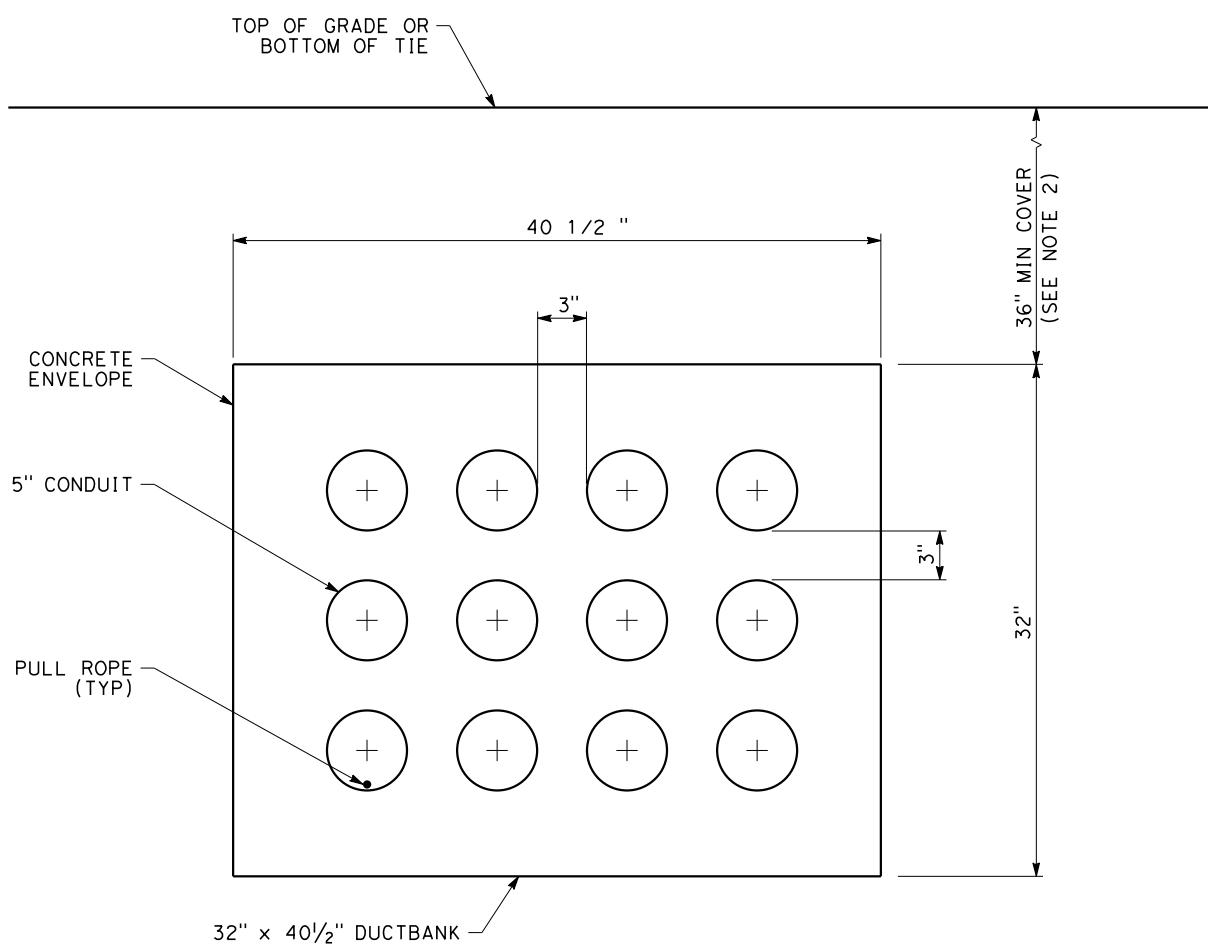
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING GANTRY
ARRANGEMENT ON AERIAL STRUCTURE

CONTRACT NO.
DRAWING NO. DD-TP-F201
SCALE NO SCALE
SHEET NO.

NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK DETAILS FOR 5" CONDUIT FOR ILLUSTRATION PURPOSES ONLY. DESIGN THE DUCT BANK TO SITE AND EQUIPMENT SPECIFIC REQUIREMENTS CONFORMING TO RELEVANT CODES, SPECIFICATIONS AND DESIGN CRITERIA.
2. A 36" MINIMUM COVER SHALL BE MAINTAINED FROM TOP OF GRADE TO TOP OF DUCT BANK, WHEN NOT GOING UNDER RAILROAD TRACK, AND A MINIMUM 5'-6" UNDER RAILROAD TRACKS FROM THE BOTTOM OF TIE.
3. THE CONDUIT MATERIAL SHALL BE PVC OR FRC.
4. 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) MAY BE ROUTED IN THE SAME DUCTBANK BUT IN SEPARATE CONDUITS.

**3x4-WAY DUCT BANK**

NO SCALE

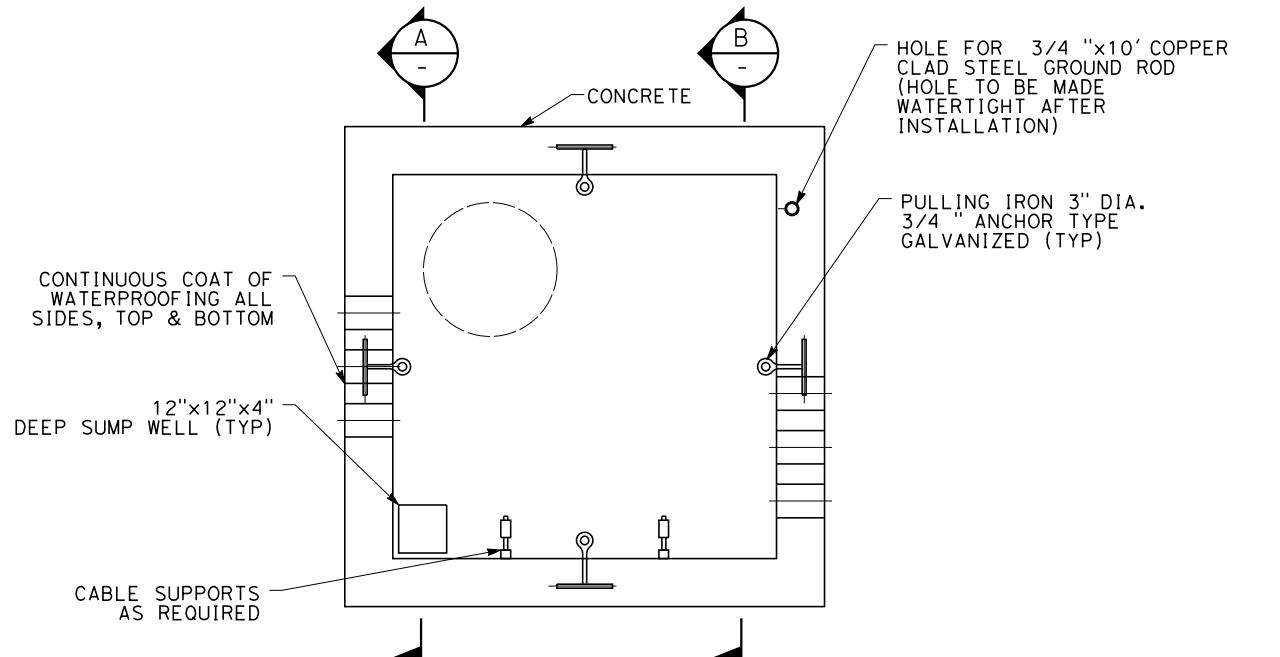
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					01/24/2014	

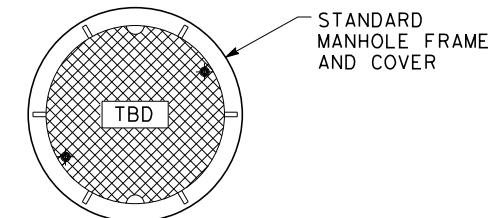
**PARSONS
BRINCKERHOFF****CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL 25KV DUCT BANK DETAIL

CONTRACT NO.
DRAWING NO. DD-TP-N101
SCALE NO SCALE
SHEET NO.



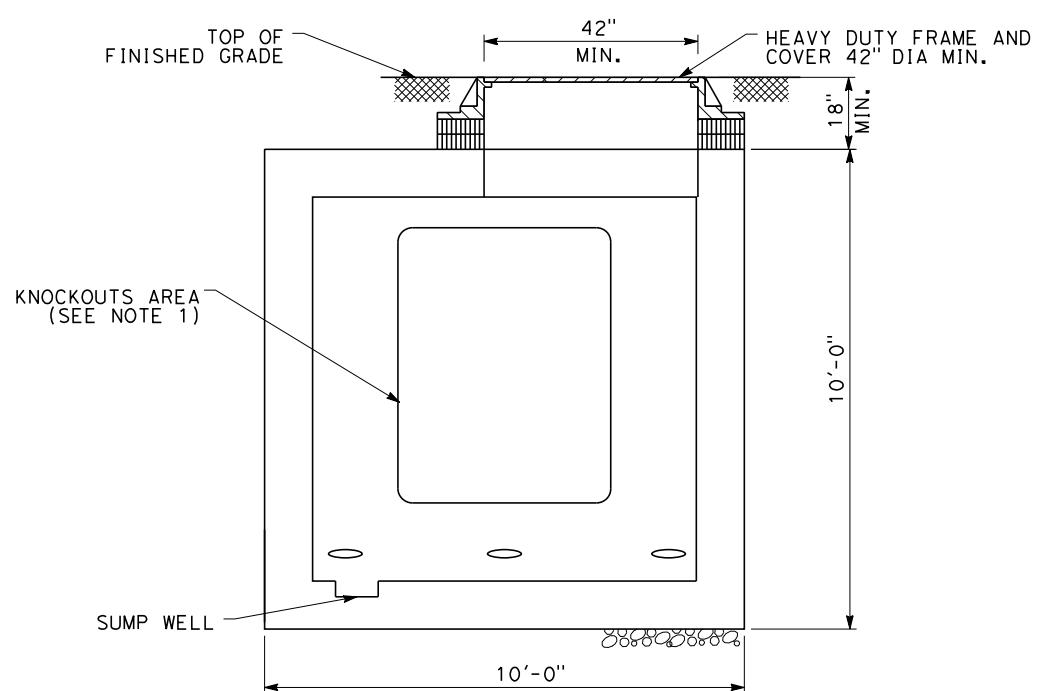
PLAN
TYPICAL PRECAST ELECTRIC MANHOLE



PLAN
ELECTRIC MANHOLE FRAME
AND COVER DETAIL

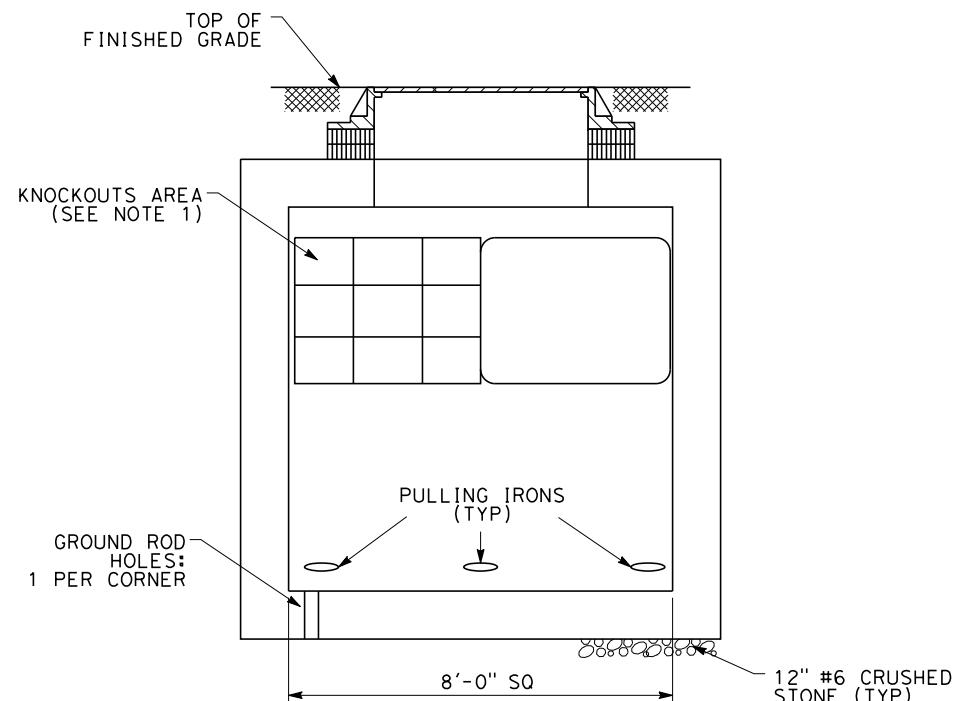
NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK KNOCKOUTS IN A PRECAST MANHOLE. EXACT DETAILS TO BE WORKED OUT AT DETAILED DESIGN LEVEL.
2. ALL TRACTION POWER MANHOLES SHALL BE TYPICALLY 10'-0" L X 10'-0" W X 10'-0" DEEP AND BE WATERTIGHT WITH SILICON SEALING COMPOUND, OR APPROVED EQUAL.
3. THE MANHOLE FRAME SHALL BE GROUTED TO THE ROOF SLAB.
4. THICKNESS OF MANHOLE WALL SHALL BE 8" MINIMUM.
5. APPROVED CABLE RACK ARMS TO BE INSTALLED TO ACCOMMODATE CABLE, MINIMUM 2 RACKS PER WALL (TYP).
6. PULLING HOOKS SHALL BE GALVANIZED STEEL, SUPPLIED AND CAST INTO WALLS BY PRECASTER, AND ANCHORED BEHIND REINFORCEMENT. QUANTITY AND LOCATION TO SUIT.
7. CONNECT ALL METALLIC PARTS, FRAME, PULLING HOOKS, ETC., TO THE TRACTION POWER FACILITY GROUND GRID OR GROUND ROD.
8. PROVIDE FOR CONNECTION TO A PORTABLE PUMP TO REMOVE ACCUMULATED WATER FROM THE MANHOLE OR OTHER SITE SPECIFIC DRAINAGE SYSTEM.
9. 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) SHALL BE ROUTED IN SEPARATE MANHOLES.



TYPICAL PRECAST ELECTRIC MANHOLE

SECTION
A
-
NO SCALE



TYPICAL PRECAST ELECTRIC MANHOLE

SECTION
B
-
NO SCALE

REV	DATE	BY	CHK	APP

DESCRIPTION				

DESIGNED BY M. PAZ	PARSONS BRINCKERHOFF
DRAWN BY V. HUANTE	
CHECKED BY V. SIBAL	
IN CHARGE B. BANKS	
DATE 8/29/2014	



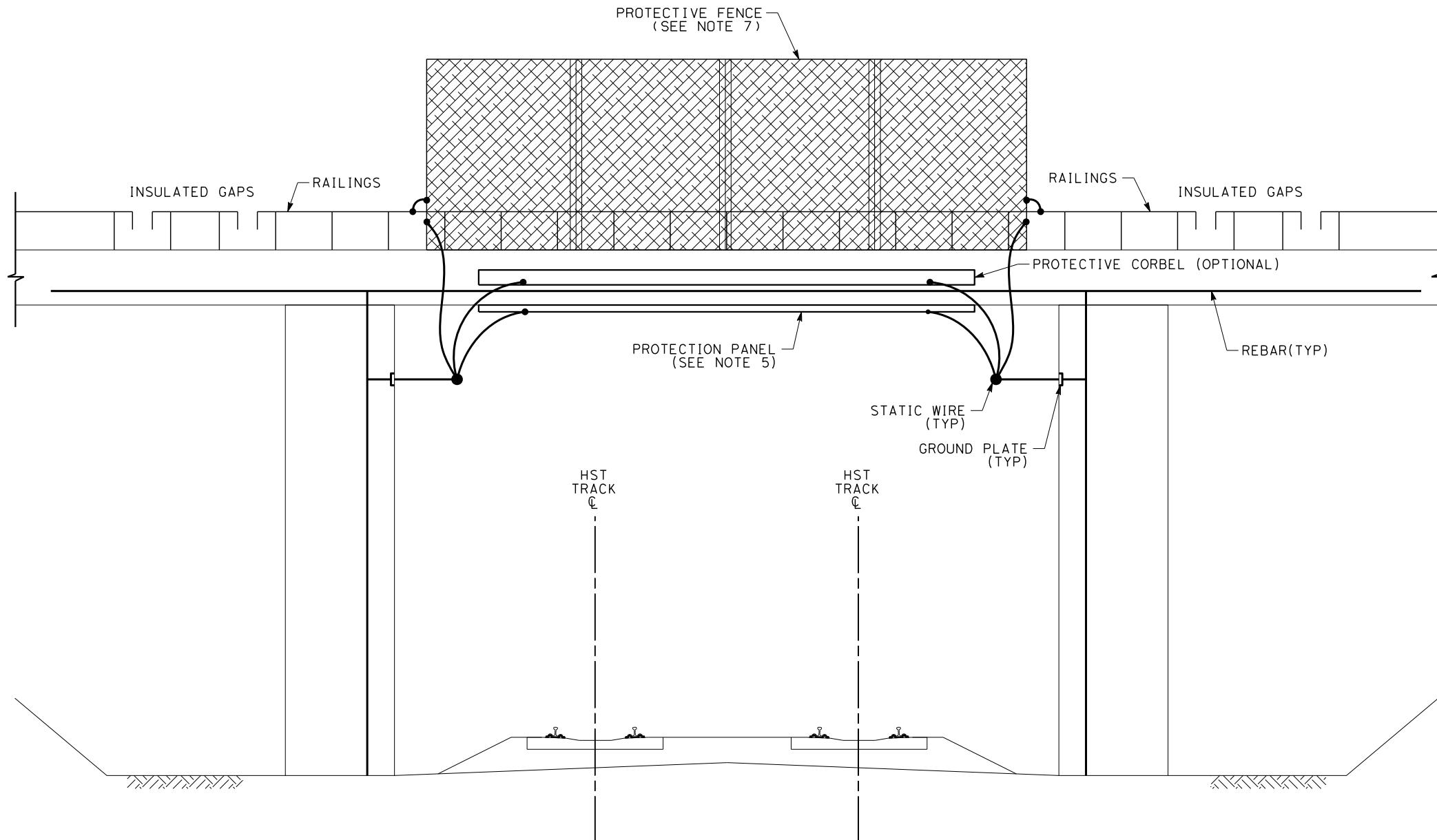
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL 25KV MANHOLE DETAILS

CONTRACT NO.	CALIFORNIA HIGH-SPEED RAIL AUTHORITY
DRAWING NO.	
SCALE	
SHEET NO.	

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SMALL METALLIC ITEMS, SUCH AS RAILING, FENCE ETC, BEYOND THE STEP AND TOUCH POTENTIAL LIMIT NEED NOT BE GROUNDED. THE STEP AND TOUCH POTENTIAL EXISTS WITHIN 8' OF A STANDING TRAIN, 8' FROM ANY ELECTRICALLY CONTINUOUS BONDED FENCE, AND 8' FROM ANY METALLIC ITEM BONDED TO STATIC WIRE.
3. GROUNDING AND BONDING DETAILS DESIGN SHALL BE COORDINATED WITH OVERPASS STRUCTURE DESIGNER.
4. OVERHEAD BRIDGE GROUNDING AND BONDING DETAILS SHOWN IN DRAWING ARE GENERIC IN NATURE. THE OCS DESIGNER SHALL PROVIDE DETAILED ASSEMBLIES AND COMPONENTS THAT MEET THE REQUIREMENT.
5. GALVANIZED STEEL STRIP OR ANGLE SECTION SHALL BE INSTALLED ABOVE THE OVERHEAD LINE AT EACH BRIDGE FACE, IF THE BRIDGE SOFFIT IS WITHIN THE PANTOGRAPH ZONE. WHEN THE VERTICAL CLEARANCE BETWEEN OCS CONDUCTORS AND CONCRETE OVERPASSES IS LESS THAN 3 FEET, PROTECTION PANELS (FLASH PLATES) SHALL BE INSTALLED ABOVE THE OCS, ATTACHED TO THE UNDERSIDE OF THE STRUCTURE, AND INTERCONNECTED TO THE STATIC WIRE AT NOT LESS THAN TWO LOCATIONS.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6" X 6" IN DIMENSION.
7. SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM AND CIVIL DESIGN CRITERIA CHAPTERS FOR PROTECTIVE FENCE CRITERIA.



TYPICAL OVERHEAD STRUCTURE GROUNDING AND BONDING

REV	DATE	BY	CHK	APP	DESCRIPTION	01/24/2014

**PARSONS
BRINCKERHOFF**



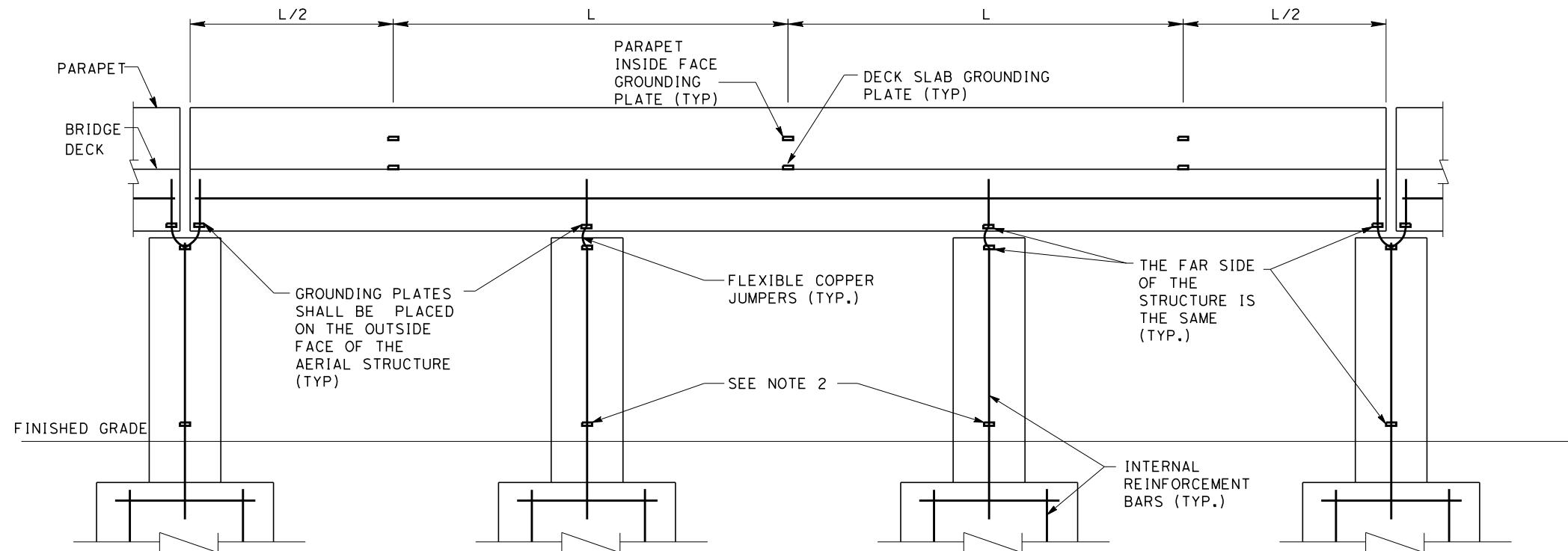
CALIFORNIA HIGH-SPEED TRAIN PROJECT OVERHEAD CONTACT SYSTEM DIRECTIVE

TYPICAL GROUNDING AND BONDING ARRANGEMENT
OVERHEAD BRIDGE STRUCTURE

CONTRACT NO.	13341
DRAWING NO.	DD-OC-2046
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. FOR SUPERSTRUCTURE UNITS THAT ARE GREATER THAN 150 FEET IN LENGTH, THE DECK SLAB AND PARAPET GROUNDING PLATES SHALL BE POSITIONED AT SPACING (L) = 150 FEET.
2. THE LOCATION OF THE LOWER COLUMN GROUNDING PLATE SHALL BE DETERMINED BY THE CONTRACTOR WITH CONSIDERATION FOR DESIGN LIFE AND RAMS.
3. IF COPPER BRAIDS ARE USED AS THE FLEXIBLE COPPER JUMPERS A STUD SUITABLE FOR CONNECTING THE BRAID LUG MUST BE EXOTHERMICALLY WELDED TO EACH GROUNDING PLATE.

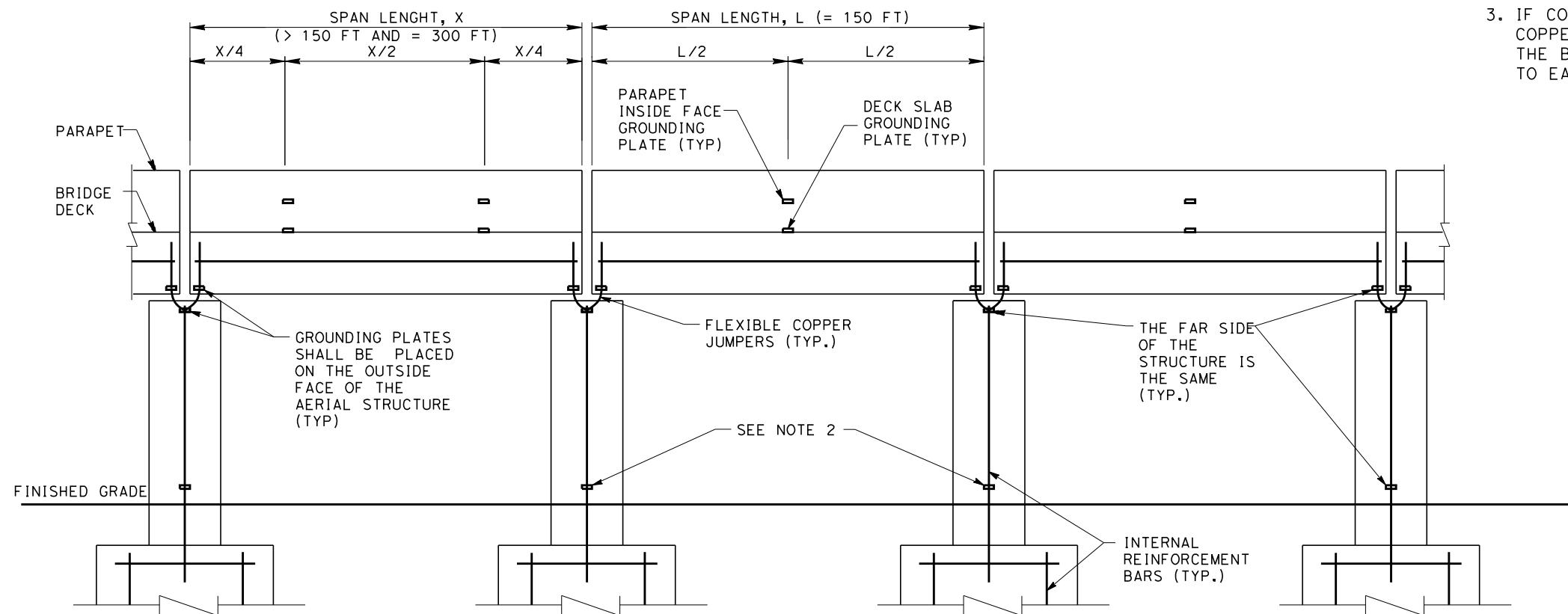


AERIAL STRUCTURE WITH CONTINUOUS BEAM

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY J. LAU DRAWN BY V. HUANTE CHECKED BY M. HSIAO IN CHARGE R. SCHMEDES DATE 08/29/2015	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CALIFORNIA HIGH-SPEED TRAIN PROJECT OVERHEAD CONTACT SYSTEM DIRECTIVE	CONTRACT NO. DRAWING NO. DD-OC-2050 SCALE NO SCALE SHEET NO.
									GROUNDING AND BONDING ARRANGEMENT AERIAL STRUCTURE WITH CONTINUOUS BEAM	

NOTES:

1. FOR SUPERSTRUCTURE UNITS THAT ARE GREATER THAN 150 FEET IN LENGTH, THE DECK SLAB AND PARAPET GROUNDING PLATES SHALL BE POSITIONED AT SPACING (L) = 150 FEET.
2. THE LOCATION OF THE LOWER COLUMN GROUNDING PLATE SHALL BE DETERMINED BY THE CONTRACTOR WITH CONSIDERATION FOR DESIGN LIFE AND RAMS.
3. IF COPPER BRAIDS ARE USED AS THE FLEXIBLE COPPER JUMPERS A STUD SUITABLE FOR CONNECTING THE BRAID LUG MUST BE EXOTHERMICALLY WELDED TO EACH GROUNDING PLATE.



AERIAL STRUCTURE WITH SIMPLY SUPPORTED BEAMS

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CALIFORNIA HIGH-SPEED RAIL AUTHORITY

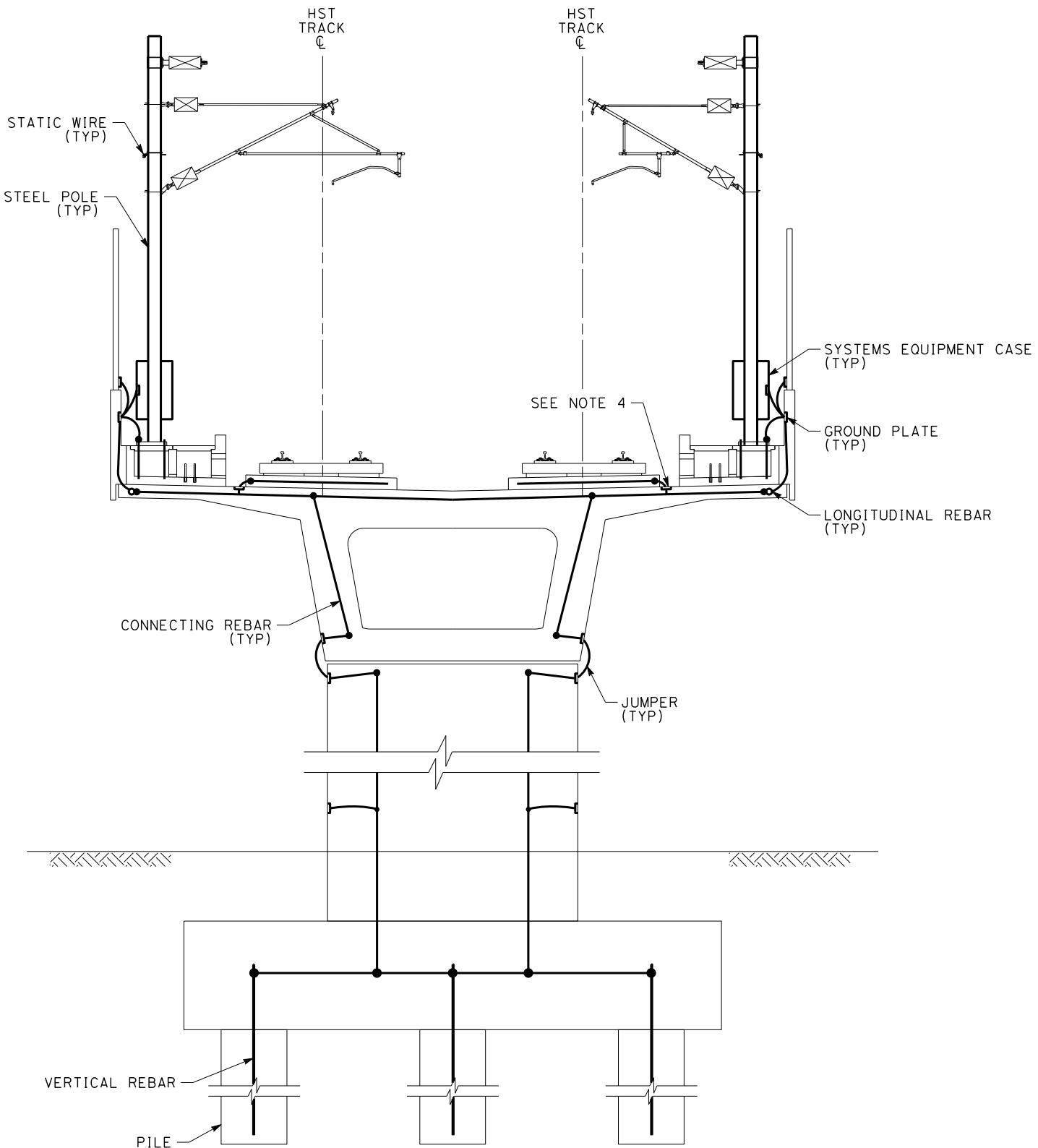
CALIFORNIA HIGH-SPEED TRAIN PROJECT OVERHEAD CONTACT SYSTEM DIRECTIVE

GROUNDING AND BONDING ARRANGEMENT AERIAL STRUCTURE WITH SIMPLY SUPPORTED BEAMS

CONTRACT NO.
DRAWING NO.
DD-OC-2051
SCALE
NO SCALE
SHEET NO.

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. GROUNDING AND BONDING DETAIL DESIGN SHALL BE COORDINATED WITH AERIAL STRUCTURE DESIGNER.
3. THE GROUNDING AND BONDING FOR THE EMERGENCY WALKWAY AREA AND OTHER PUBLICLY ACCESSIBLE AREAS SHALL BE DESIGNED TO AVOID INADMISSIBLE TOUCH AND STEP VOLTAGES AND ALSO MEET SIGNALING OPERATION REQUIREMENTS.
4. FOR LOCATIONS OF THE GROUND PLATES, SEE GROUNDING AND BONDING DESIGN CRITERIA FOR DETAIL.
5. THE GROUND PLATES ON THE AERIAL STRUCTURE SLAB SHALL BE PLACED BETWEEN THE EDGE OF THE TRACK SLAB AND DERAILMENT WALL.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6"X6" IN DIMENSION.
7. INDIVIDUAL CONCRETE TIES DO NOT NEED TO BE BONDED TO THE TRACTION POWER RETURN SYSTEM. STEEL REINFORCEMENT IN PRECAST CONCRETE PANELS FOR DIRECT FIXATION TRACK SHALL BE BONDED AND CONNECTED TO THE TRACTION POWER RETURN SYSTEM.
8. STEEL REINFORCED CONCRETE PARAPETS AND CONDUCTIVE SCREEN, NOISE, WIND OR SAFETY BARRIERS OR RAILINGS SHALL BE BONDED TO THE TRACTION POWER RETURN SYSTEM.



**TYPICAL OCS GROUNDING AND BONDING
AT AERIAL STRUCTURE**

REV	DATE	BY	CHK	APP	DESCRIPTION
					01/24/2014

DESIGNED BY J. LAU	PARSONS BRINCKERHOFF
DRAWN BY V. HUANTE	
CHECKED BY M. HSIAO	
IN CHARGE B. BANKS	
DATE	

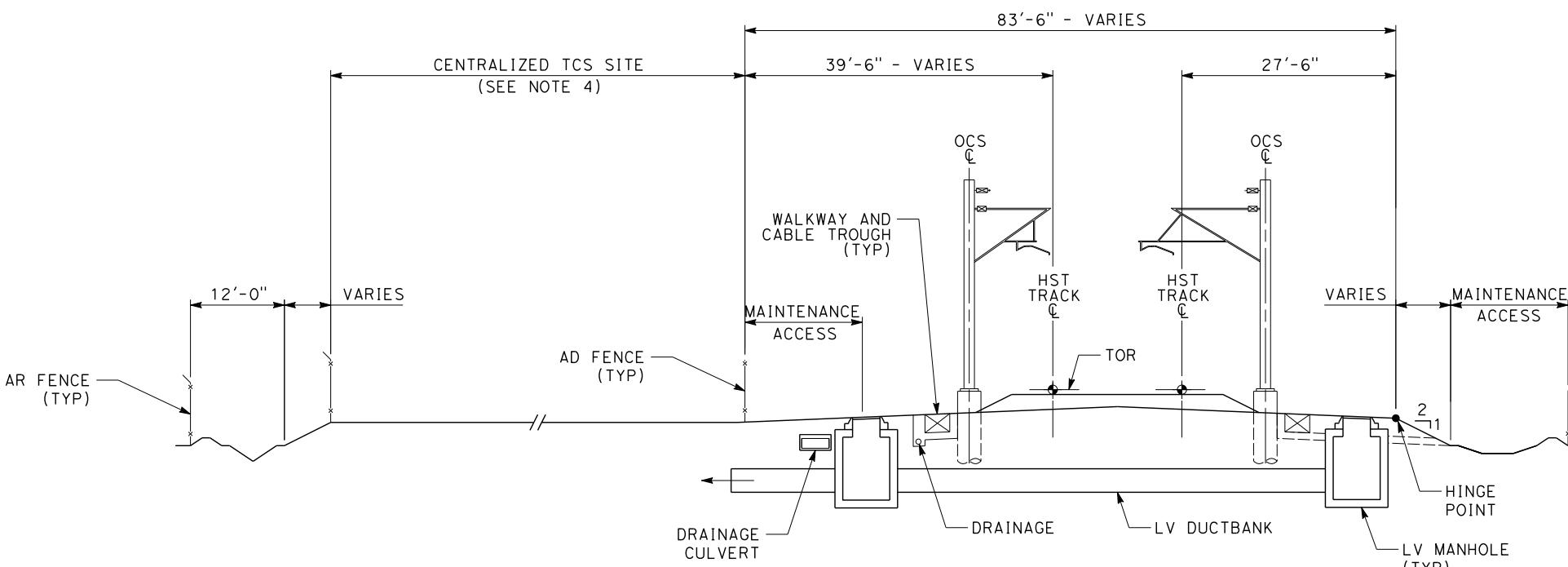
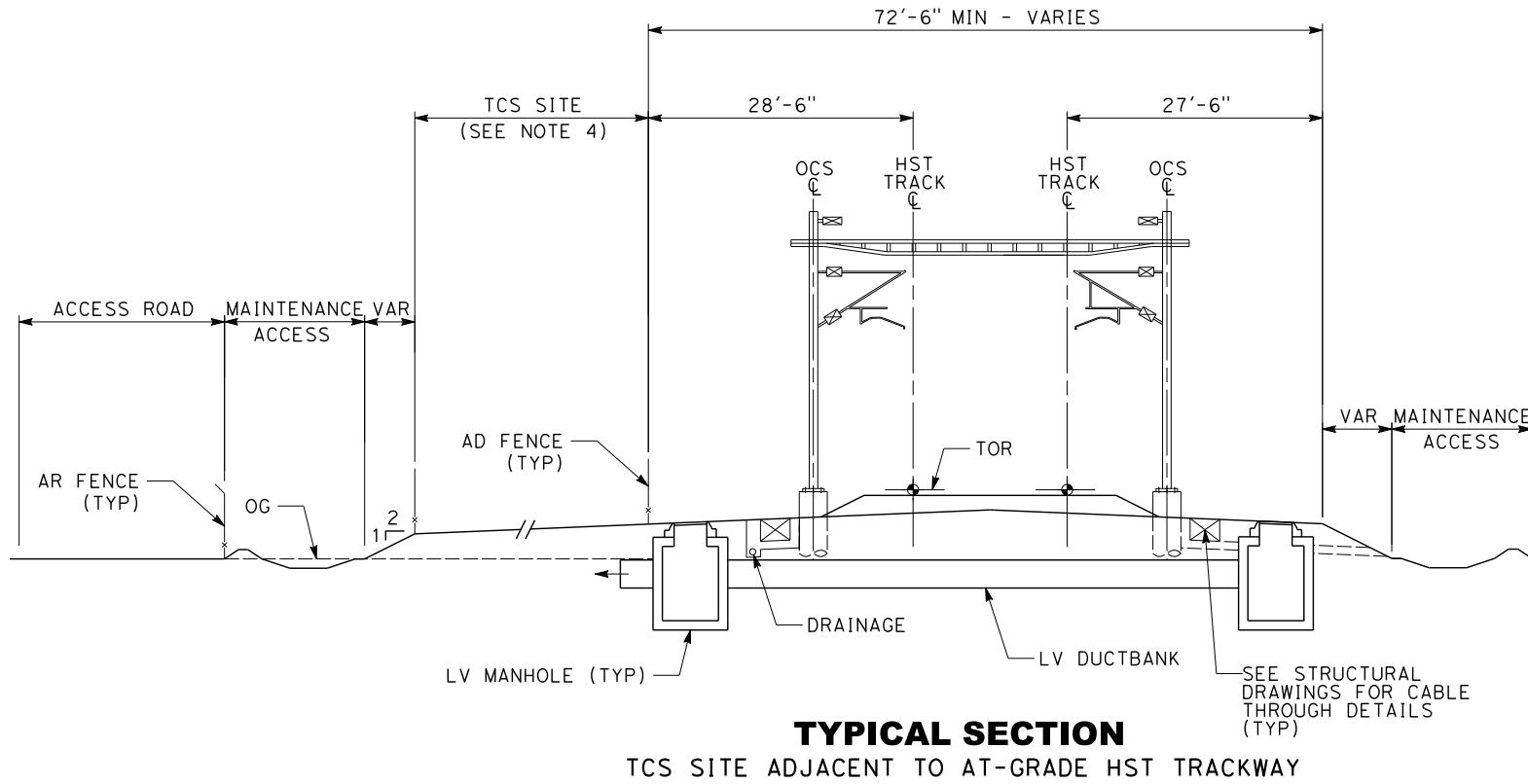


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE**
TYPICAL GROUNDING AND BONDING ARRANGEMENT
AERIAL STRUCTURE

CONTRACT NO.	
DRAWING NO.	DD-OC-2047
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
CENTRALIZED TCS SITE ADJACENT TO AT-GRADE HST TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY I. MUFTIC	
DRAWN BY V. LAVERDE	
CHECKED BY B. MCNALITY	
IN CHARGE B. BANKS	
DATE 8/29/2014	

**PARSONS
BRINCKERHOFF**

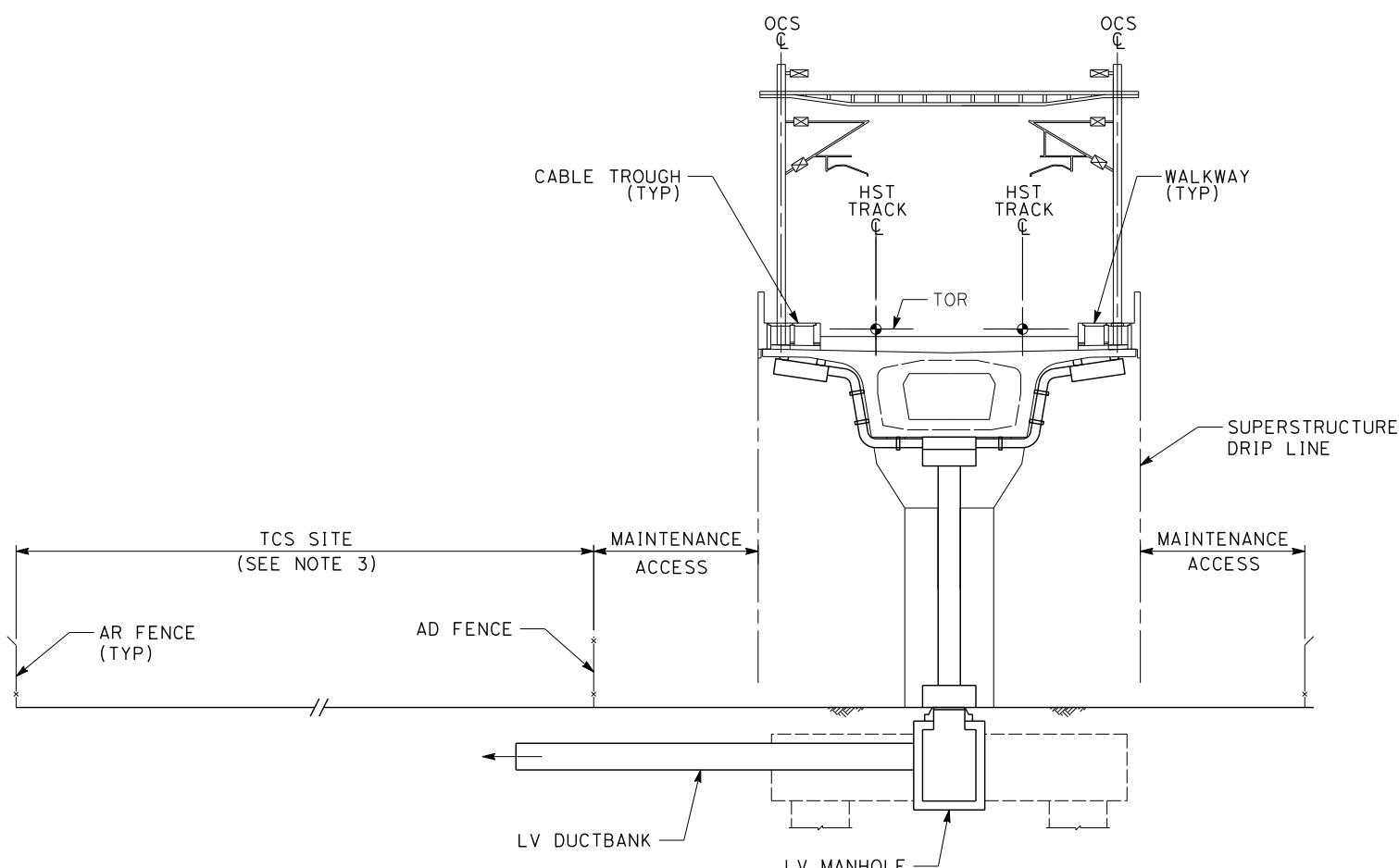


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**
SYSTEMS SITE
TCS
AT GRADE

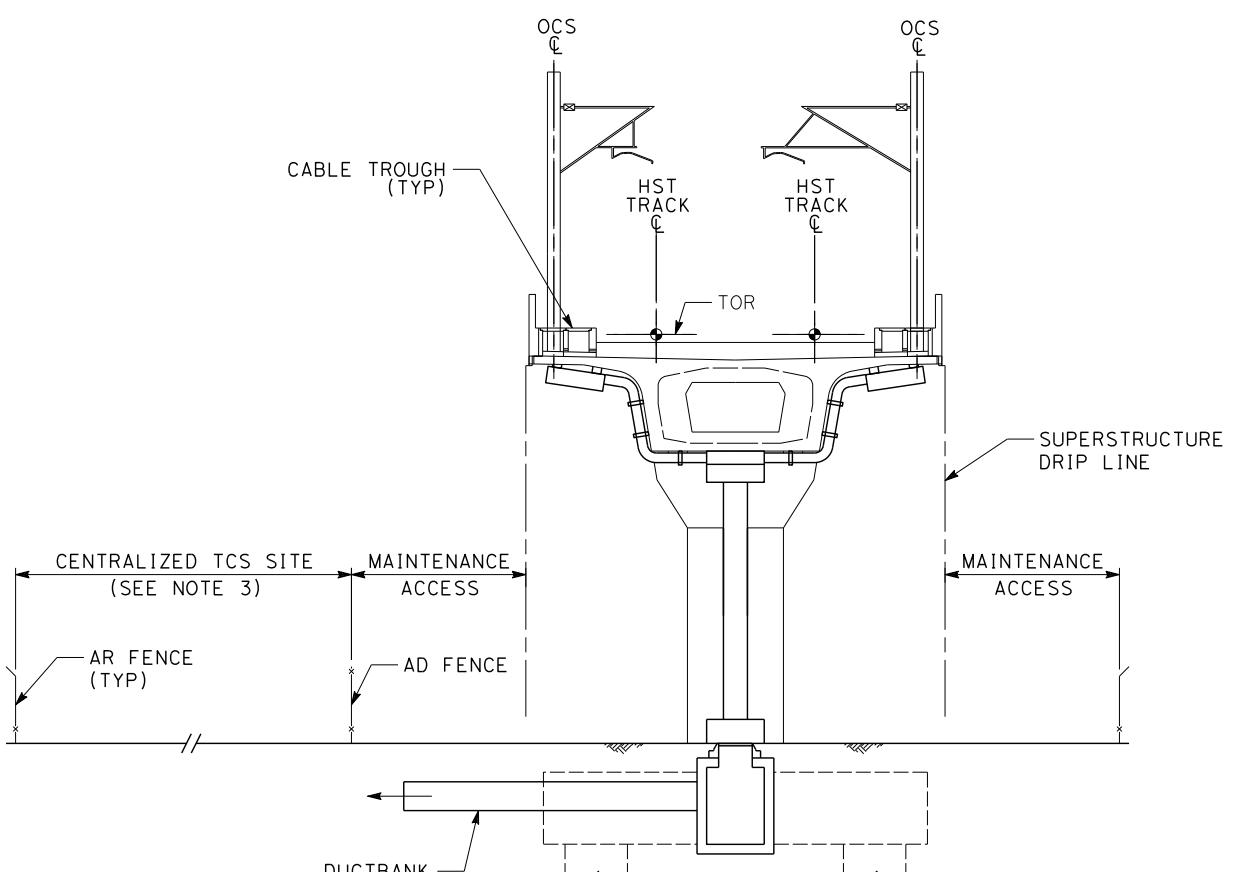
CONTRACT NO.	
DRAWING NO.	DD-TC-100
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
5. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
6. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.



TYPICAL SECTION
TCS SITE AT AERIAL TRACKWAY



TYPICAL SECTION
CENTRALIZED TCS SITE AT AERIAL TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY I. MUFTIC	
DRAWN BY V. LAVERDE	
CHECKED BY B. MCNALTY	
IN CHARGE B. BANKS	
DATE 8/29/2014	

**PARSONS
BRINCKERHOFF**

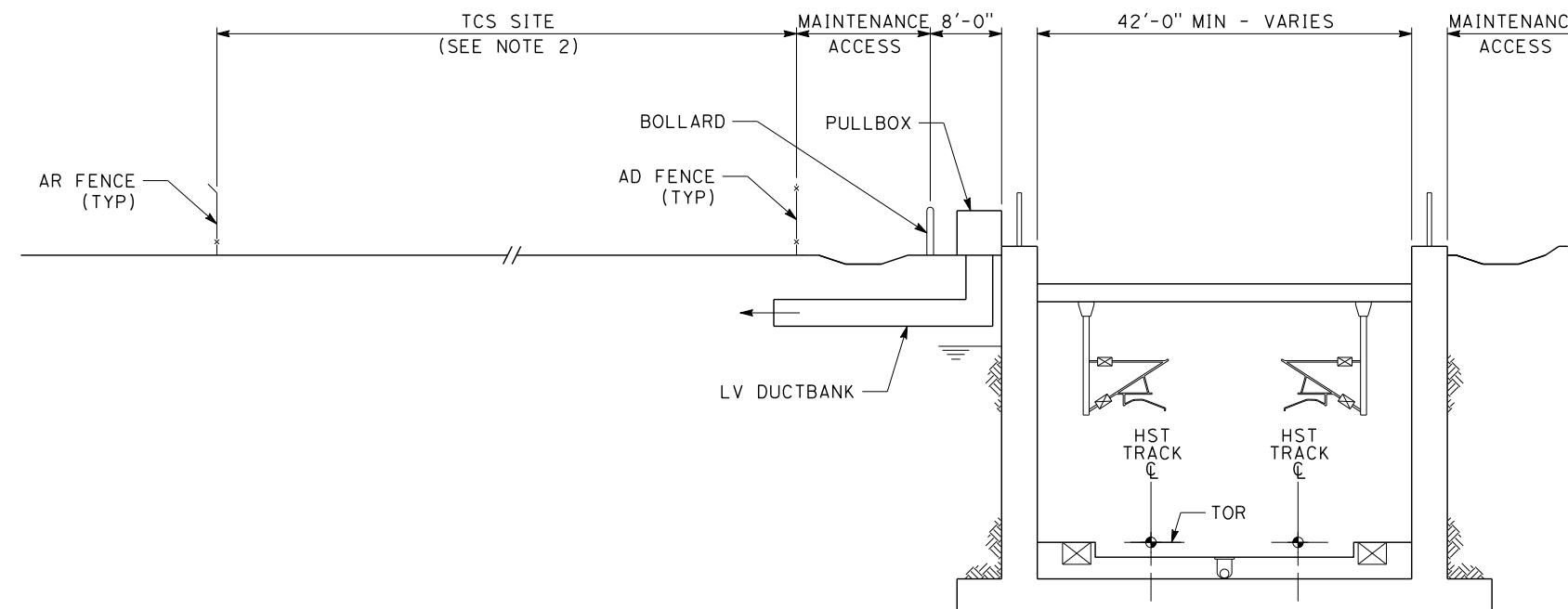


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**
SYSTEMS SITE
TCS
AERIAL

CONTRACT NO.	
DRAWING NO.	DD-TC-101
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE TRAIN CONTROL SITE D OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.



TYPICAL SECTION
TCS SITE ADJACENT TO HST TRACKWAY
TRENCH

REV	DATE	BY	CHK	APP	DESCRIPTION
	8/29/2014				

DESIGNED BY I. MUFTIC
DRAWN BY V. HUANTE
CHECKED BY B. MCNALLY
IN CHARGE B. BANKS
DATE 8/29/2014

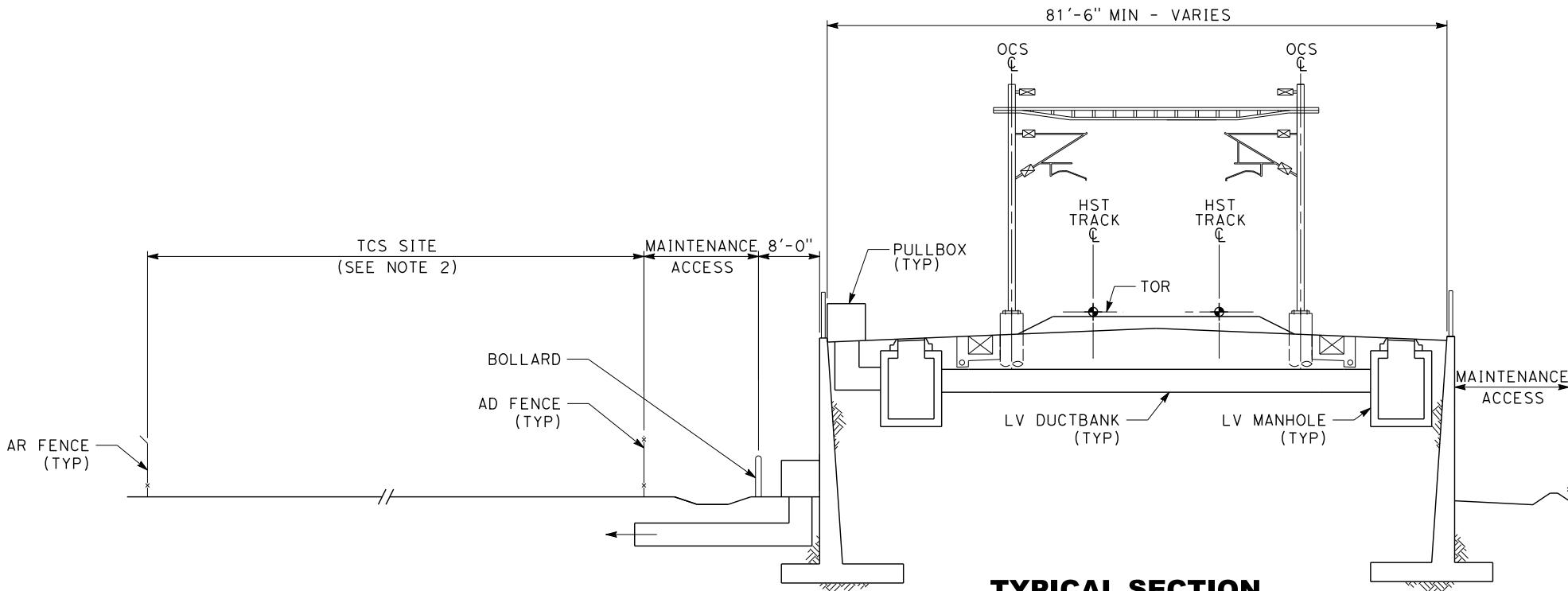
**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
AUTOMATIC TRAIN DIRECTIVE**

SYSTEMS SITE
TCS
TRENCH

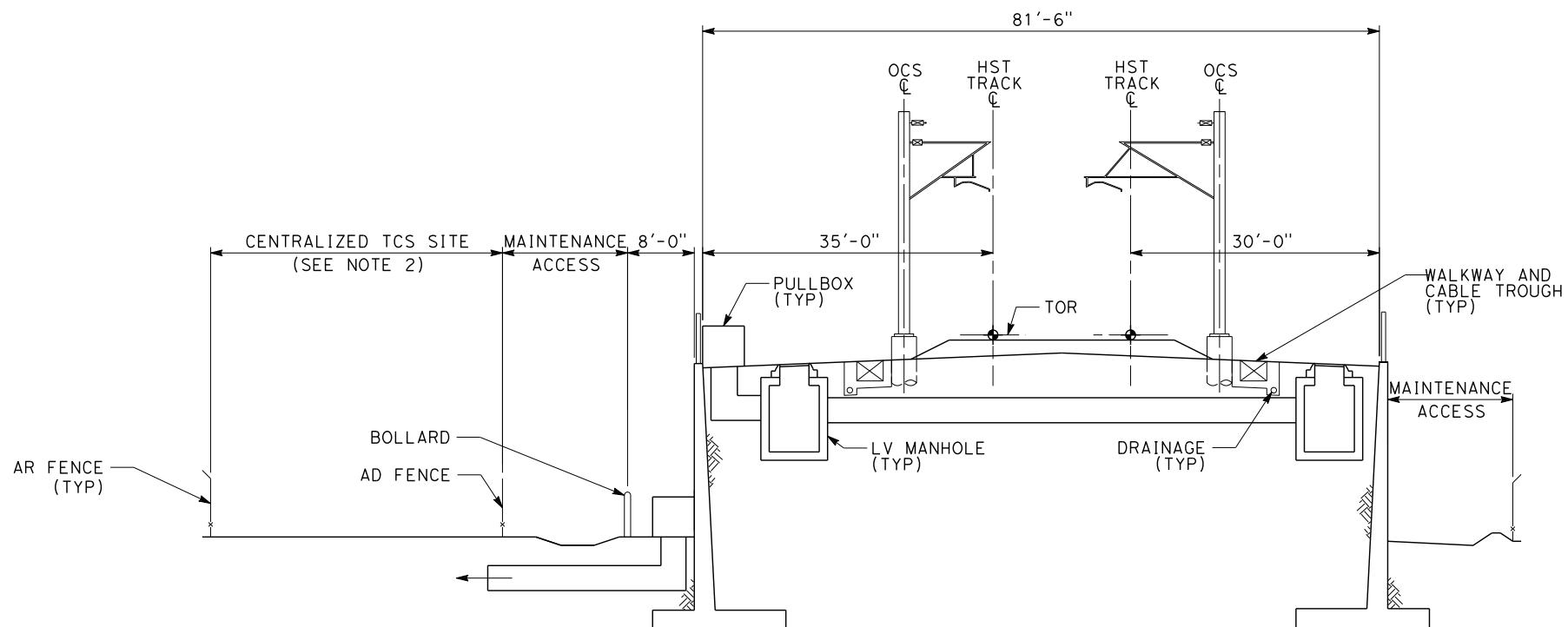
CONTRACT NO.
DRAWING NO. DD-TC-102
SCALE NO SCALE
SHEET NO.



TYPICAL SECTION
TCS SITE ADJACENT TO HST TRACKWAY
RETAINING WALL

NOTES:

1. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
2. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST AUTOMATIC TRAIN CONTROL SITES AT AN INTERLOCKING.
3. FOR TRAIN CONTROL SYSTEM SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
4. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
CENTRALIZED TCS SITE ADJACENT TO HST TRACKWAY
RETAINING WALL

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY I. MUFTIC	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALLY	IN CHARGE B. BANKS	DATE 8/29/2014

**PARSONS
BRINCKERHOFF**

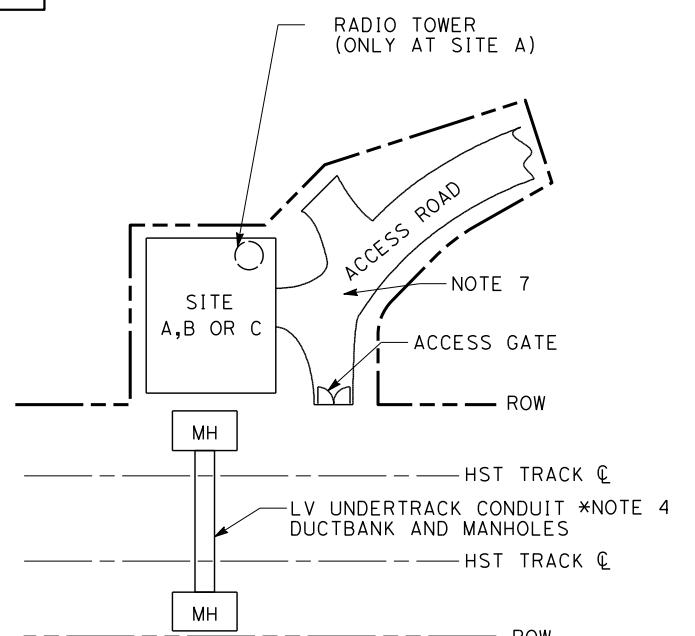
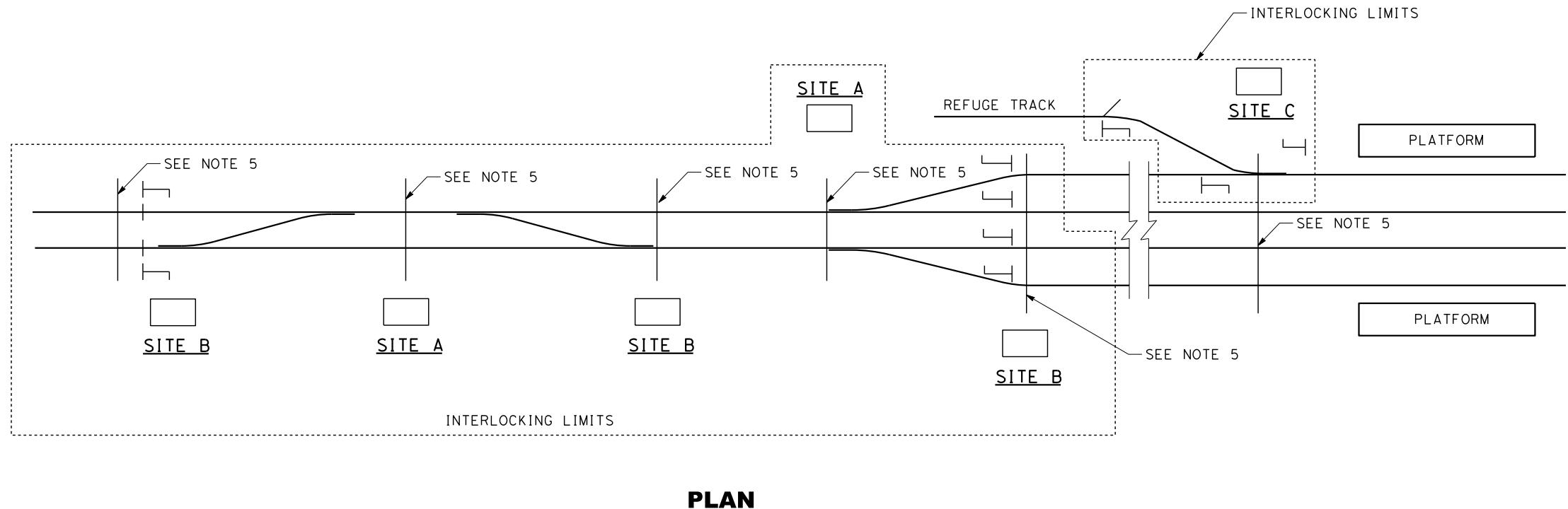


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL SYSTEM DIRECTIVE**
SYSTEMS SITE
TCS
RETAINED FILL

CONTRACT NO.
DRAWING NO. DD-TC-103
SCALE NO SCALE
SHEET NO.

NOTES:

1. SITES A AND B MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES A AND B, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE A WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



WITH LOW-VOLTAGE UNDERTRACK CONDUIT
DUCTBANK, ACCESS ROADS AND GATES

DESIGNED BY J. MUFTIC	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALLY	IN CHARGE B. BANKS	DATE 8/29/2014

**PARSONS
BRINCKERHOFF**

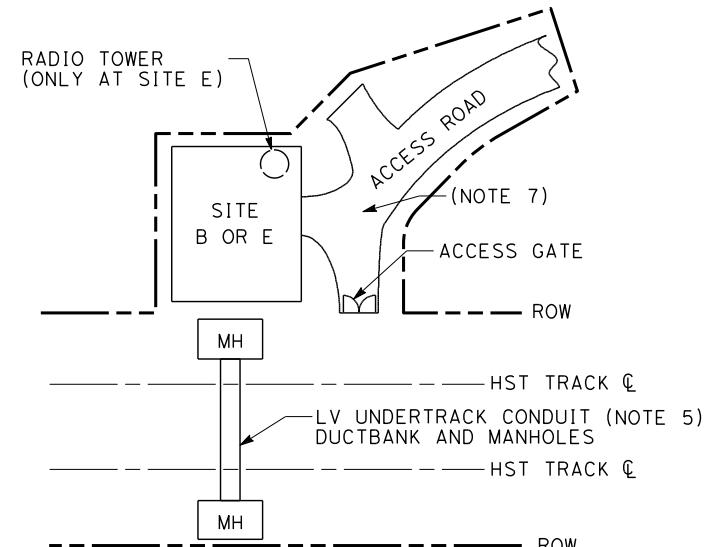
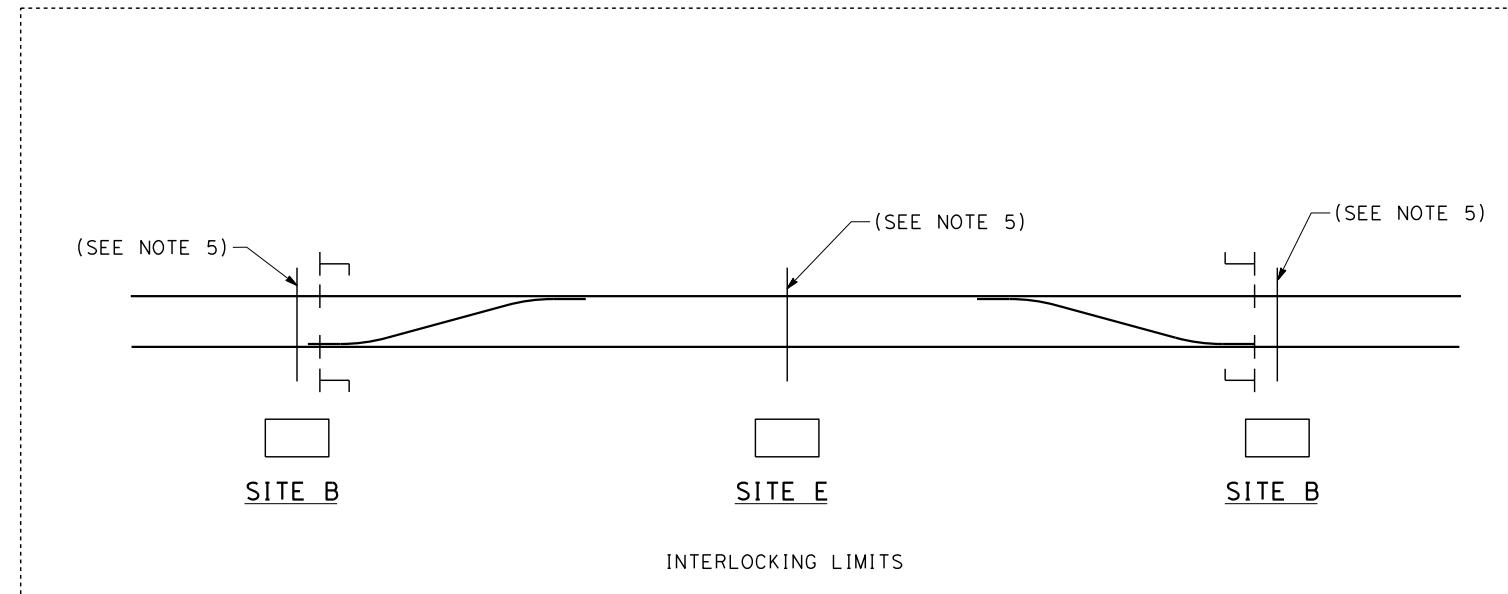


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**
TYPICAL TCS SITES
LAYOUT AT STATION AND INTERLOCKINGS

CONTRACT NO.
DRAWING NO. DD-TC-200
SCALE NO SCALE
SHEET NO.

NOTES:

1. SITES B AND E MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES B AND E, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE E WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.

**SITE B OR E**

WITH LOW-VOLTAGE UNDERTRACK CONDUIT
DUCTBANK, ACCESS ROADS AND GATES

REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY J. MUFTIC DRAWN BY V. LAVERDE CHECKED BY B. MCNALLY IN CHARGE B. BANKS DATE 8/29/2014
Mincio						

**PARSONS
BRINCKERHOFF**

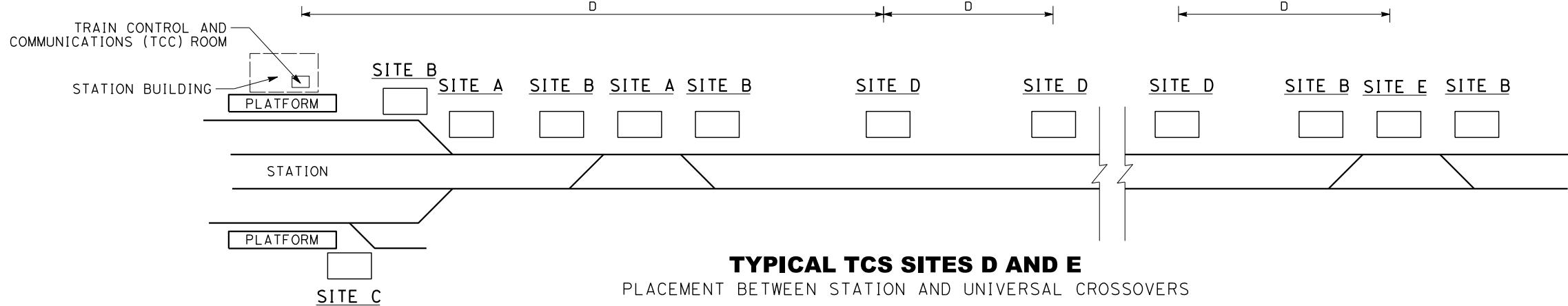


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITES AND
INTERLOCKINGS LAYOUT AT UNIVERSAL CROSSOVERS

CONTRACT NO.
DRAWING NO. DD-TC-201
SCALE NO SCALE
SHEET NO.

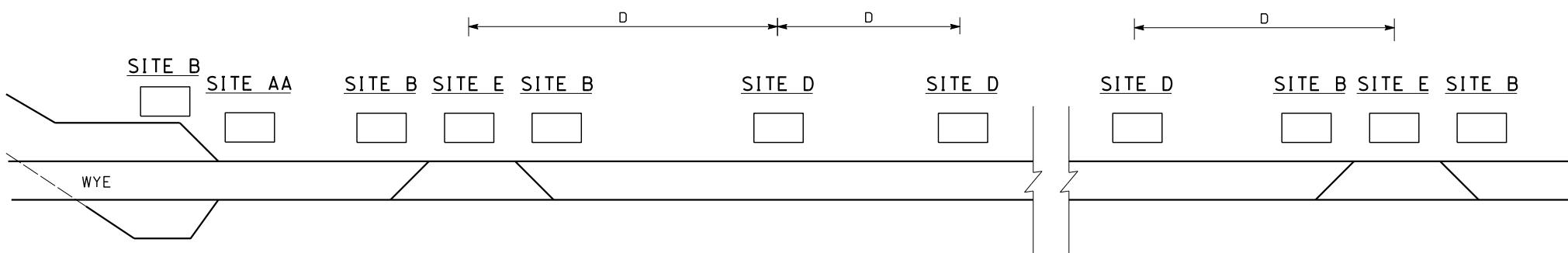
D = 7.5 MILES NOMINAL; 5.8 MILES < D < 8.7 MILES



TYPICAL TCS SITES D AND E

PLACEMENT BETWEEN STATION AND UNIVERSAL CROSSOVERS

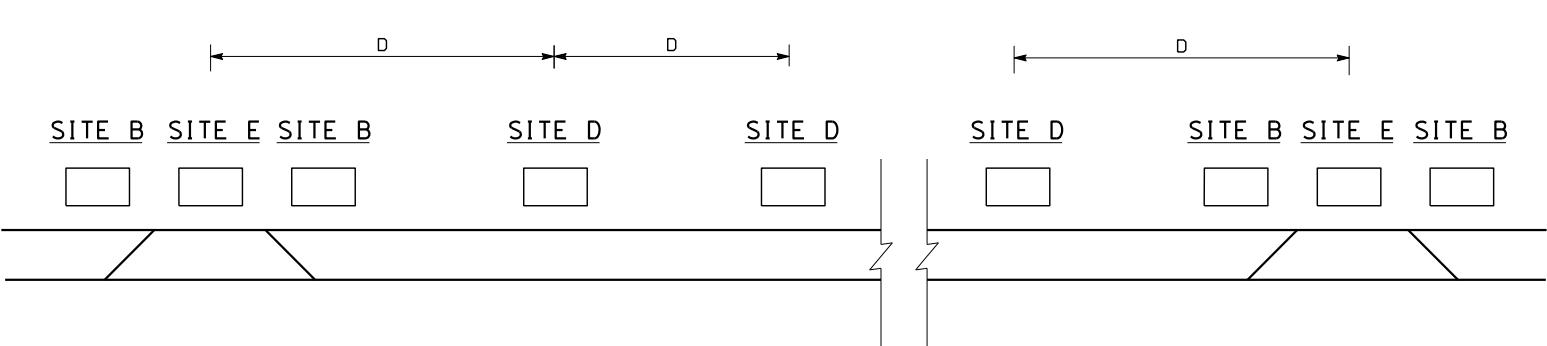
D = 7.5 MILES NOMINAL; 5.8 MILES < D < 8.7 MILES



TYPICAL TCS SITES D AND E

PLACEMENT BETWEEN WYE AND UNIVERSAL CROSSOVERS

D = 7.5 MILES NOMINAL; 5.8 MILES < D < 8.7 MILES

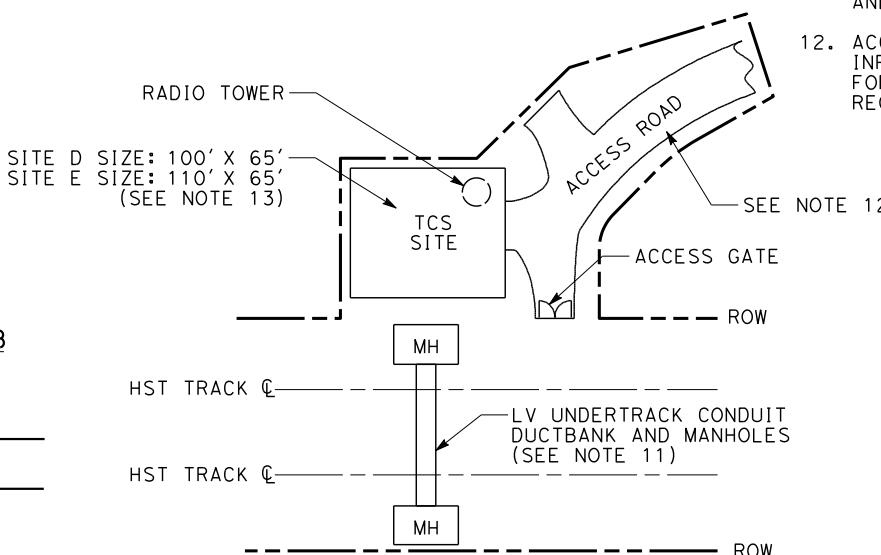


TYPICAL TCS SITES D AND E

PLACEMENT BETWEEN TWO ADJACENT UNIVERSAL CROSSOVERS

NOTES:

1. THIS DRAWING SHOWS A TYPICAL SPACING BETWEEN STATION TRAIN CONTROL AND COMMUNICATIONS (TCC) ROOM, D SITES, AND E SITES AT UNIVERSAL CROSSOVERS.
2. IF THE STATION DESIGN IS NOT AVAILABLE, THE CENTER LINE OF PLATFORM SHALL BE USED AS A REFERENCE POINT INSTEAD OF THE EXACT LOCATION OF THE TCC ROOM.
3. D SITES SHALL BE PROVIDED AT THE NOMINAL DISTANCE OF 7.5 MILES BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS.
4. MINIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 5.8 MILES.
5. MAXIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 8.7 MILES.
6. D SITES MAY BE LOCATED ON EITHER SIDE OF TRACK.
7. FOR EACH D SITE, AN ALTERNATIVE SHALL BE PROVIDED.
8. IF THERE IS AN EXISTING STAND ALONE RADIO SITE (SRS) WITHIN THE SPACING LIMITS FOR A D SITE, THE SRS CAN BE REPLACED WITH A NEW D SITE.
9. IF THERE IS A TRACTION POWER FACILITY (TPF) WITHIN THE SPACING LIMITS FOR AN ATC D SITE, THE ATC D SITE CAN BE PLACED CLOSE TO THE TPF SITE TO UTILIZE THE SAME ACCESS ROAD.
10. THIS CRITERIA IS NOT APPLICABLE FOR TUNNELS LONGER THAN 6 MILES AND THOSE WILL BE CONSIDERED AS A SPECIAL CASE.
11. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
12. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



TYPICAL SITES D & E CONFIGURATION

WITH LOW-VOLTAGE UNDERTRACK CONDUIT
DUCTBANK, ACCESS ROADS AND GATES

DESIGNED BY
J. MUFTIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

**PARSONS
BRINCKERHOFF**

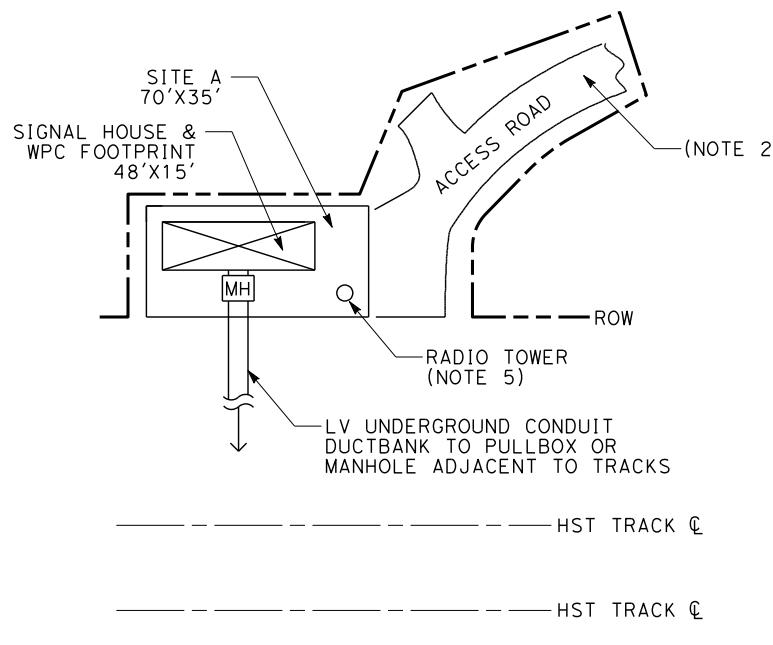
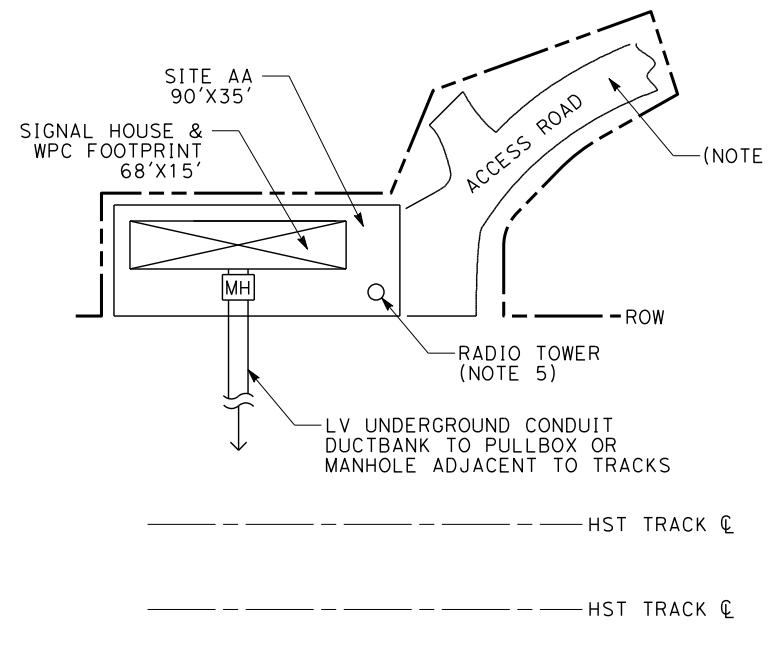
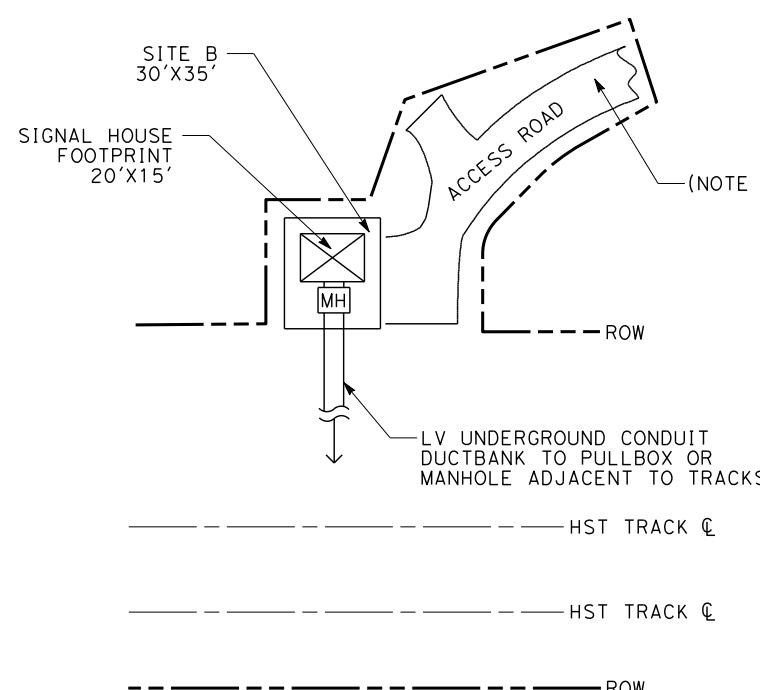
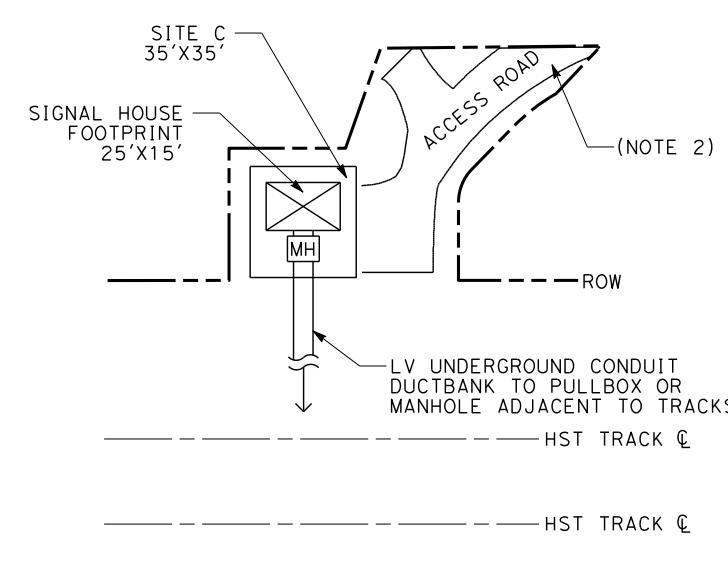


CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS
SITES D AND E CONFIGURATION

CONTRACT NO.
DRAWING NO.
DD-TC-202
SCALE
NO SCALE
SHEET NO.

**SITE A TYPICAL CONFIGURATION****SITE AA TYPICAL CONFIGURATION****SITE B TYPICAL CONFIGURATION****SITE C TYPICAL CONFIGURATION**

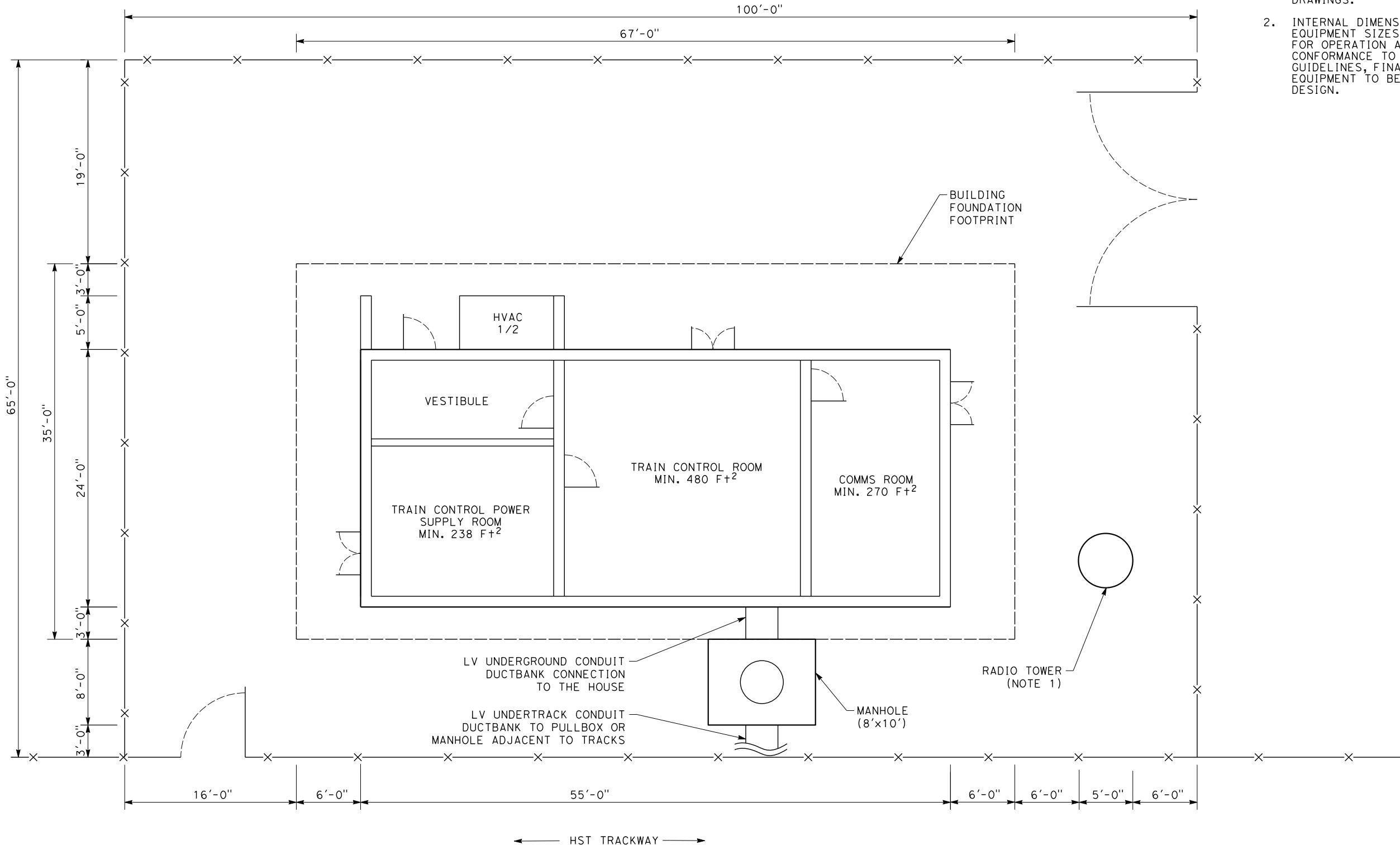
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY I. MUFTIC	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALLY	IN CHARGE B. BANKS	DATE 8/29/2014

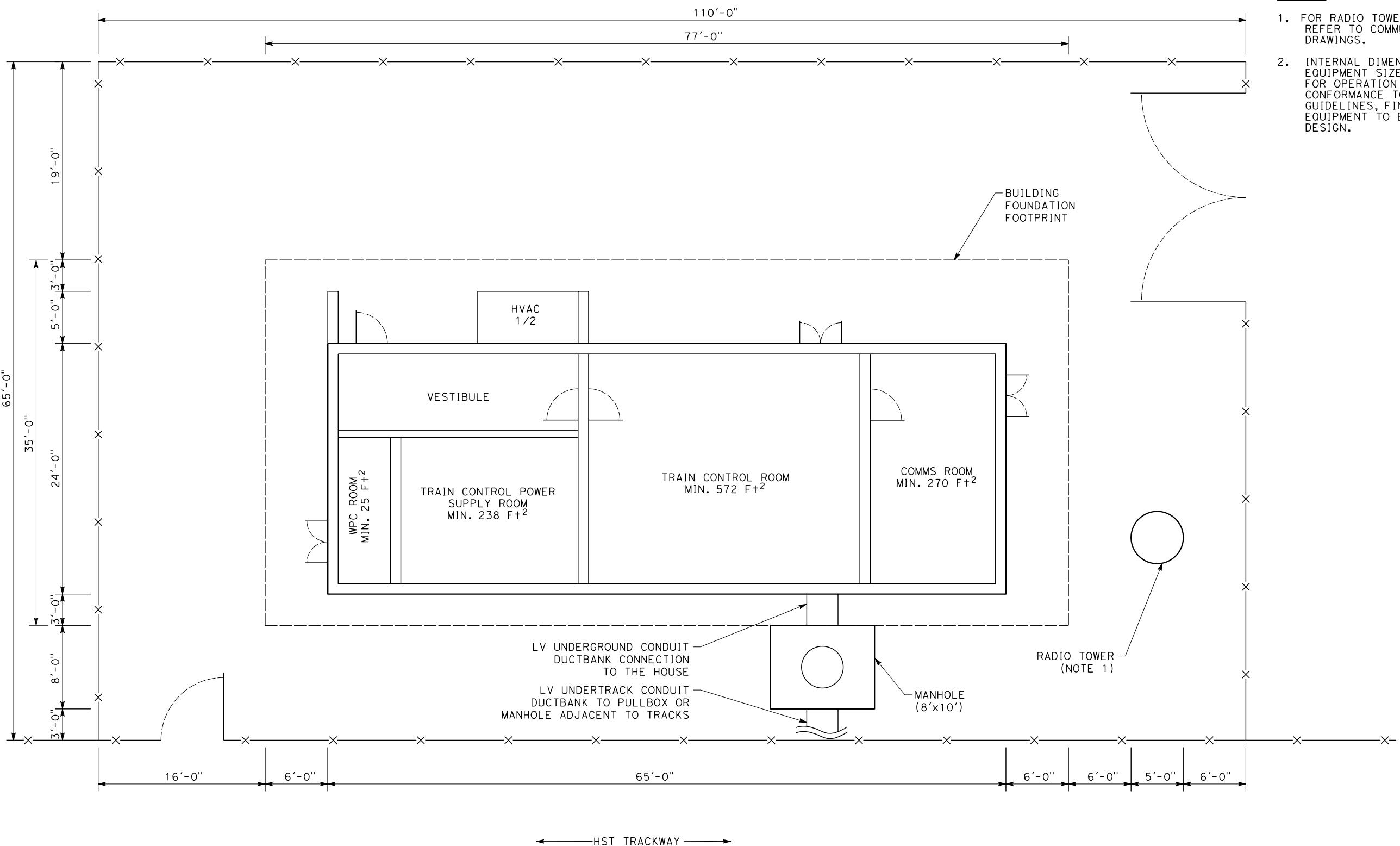
**PARSONS
BRINCKERHOFF****CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**TYPICAL TCS SITES
A, AA, B, & C LAYOUT

CONTRACT NO.
DRAWING NO.
DD-TC-203
SCALE
NO SCALE
SHEET NO.

NOTES:

1. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.
2. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES, CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.





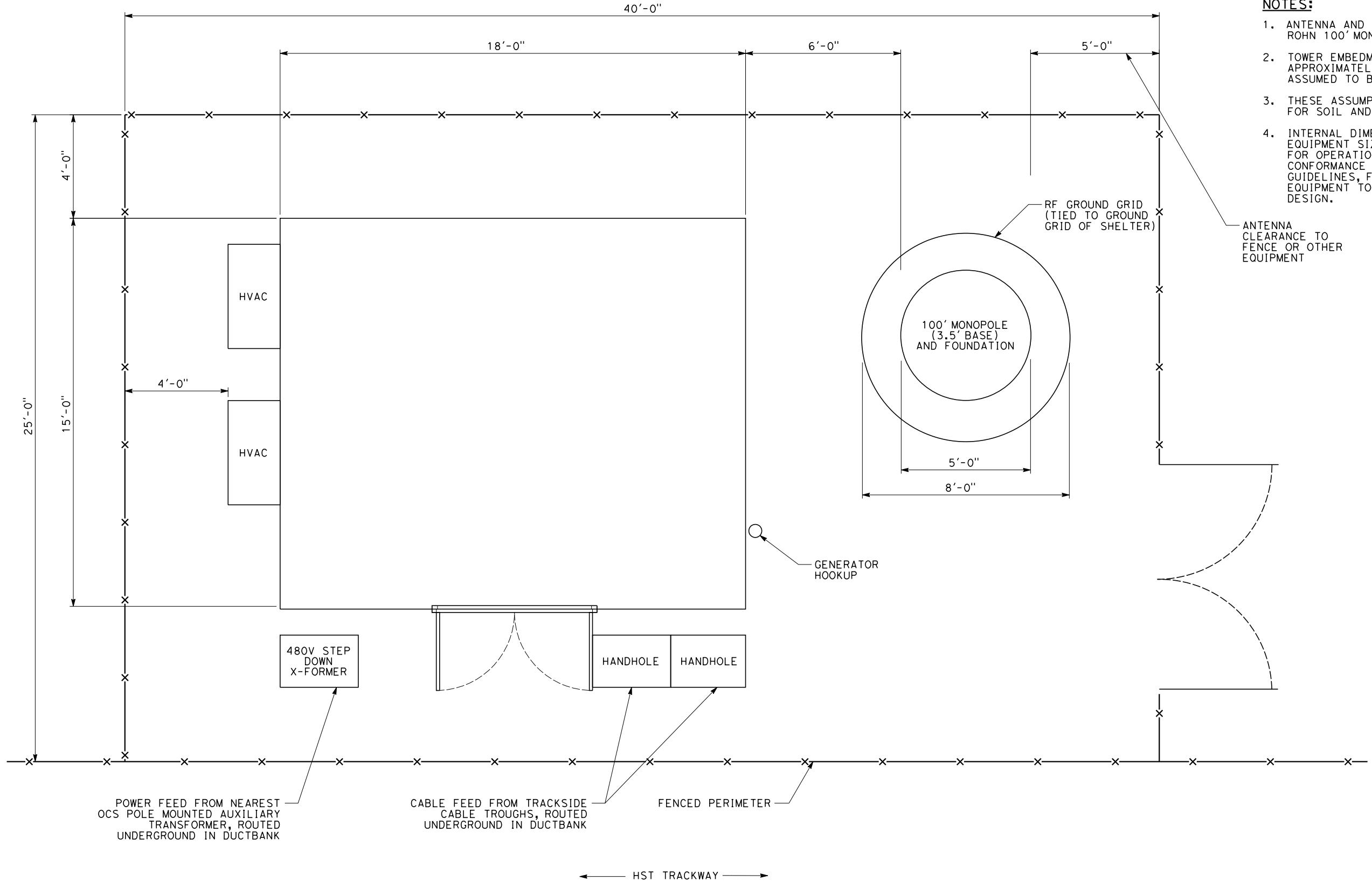
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY J. MUFTIC	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALLY	IN CHARGE B. BANKS	DATE 8/29/2014

**PARSONS
BRINCKERHOFF**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITE E LAYOUT

CONTRACT NO.	
DRAWING NO.	DD-TC-205
SCALE	NO SCALE
SHEET NO.	

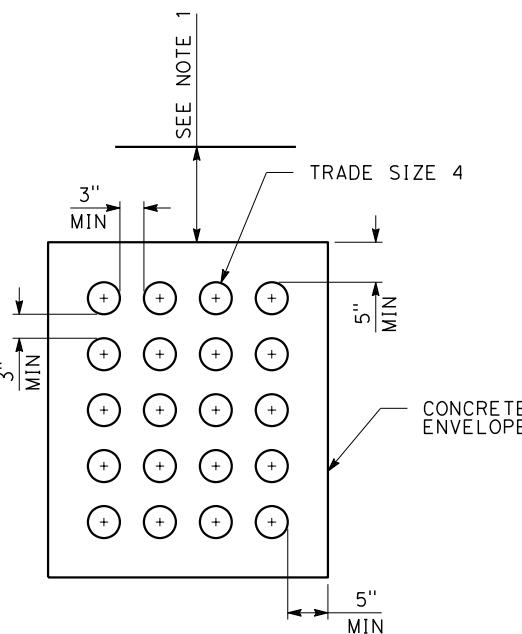
**NOTES:**

1. ANTENNA AND SUPPORT DIMENSIONS ARE BASED ON ROHN 100' MONPOLE T100HA.
2. TOWER EMBEDMENT DEPTH ASSUMED TO BE APPROXIMATELY 25 FEET TOWER BASE AND FOUNDATION ASSUMED TO BE 5 FOOT DIAMETER.
3. THESE ASSUMPTIONS SHALL BE VALIDATED BY DESIGN FOR SOIL AND ENVIRONMENTAL CONDITIONS.
4. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

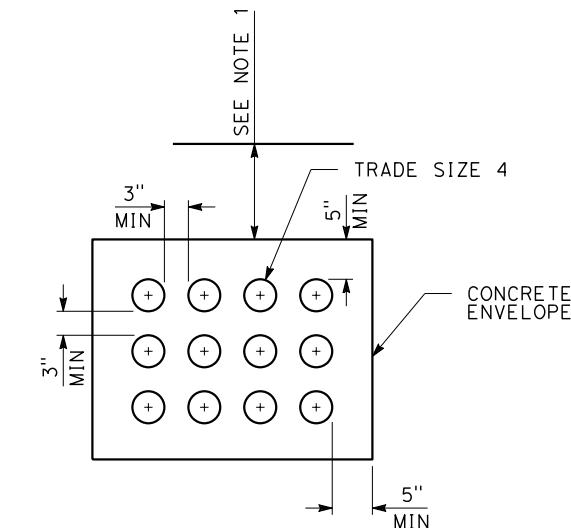
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY C. DALOIA DRAWN BY V. LAVERDE CHECKED BY B. MCNALITY IN CHARGE B. BANKS DATE 8/29/2014	PARSONS BRINCKERHOFF	CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CALIFORNIA HIGH-SPEED TRAIN PROJECT COMMUNICATIONS DIRECTIVE	CONTRACT NO. DRAWING NO. DD-CO-F080 SCALE NO SCALE SHEET NO.
									CONCEPTUAL LAYOUT COMMUNICATIONS SPACES PHYSICAL SITE LAYOUT	

NOTES:

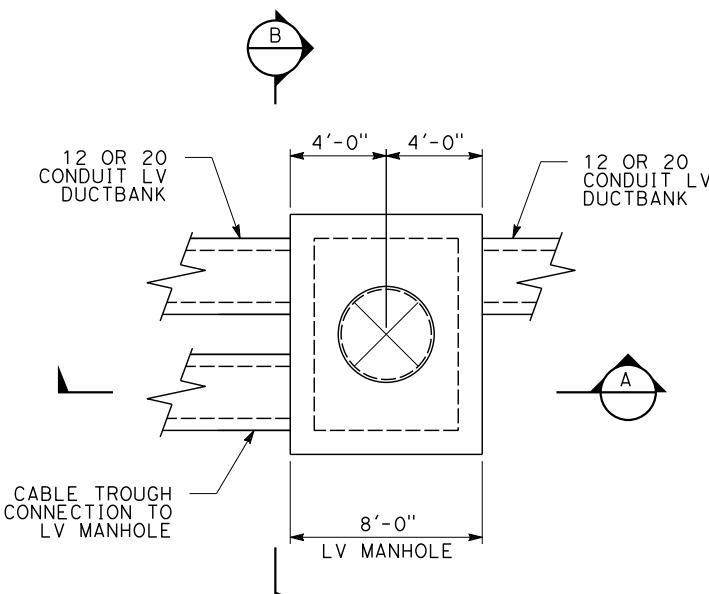
1. CONCRETE ENCASED DUCT BANK TO BE PLACED A MINIMUM 6' BELOW TOP OF RAIL AND MINIMUM 3' BELOW GRADE WHEN NO RAIL IS PRESENT.
2. LOW VOLTAGE DUCT BANK TO BE LOCATED PER THE CRITERIA LISTED IN THE COMMUNICATIONS DESIGN CRITERIA CHAPTER.



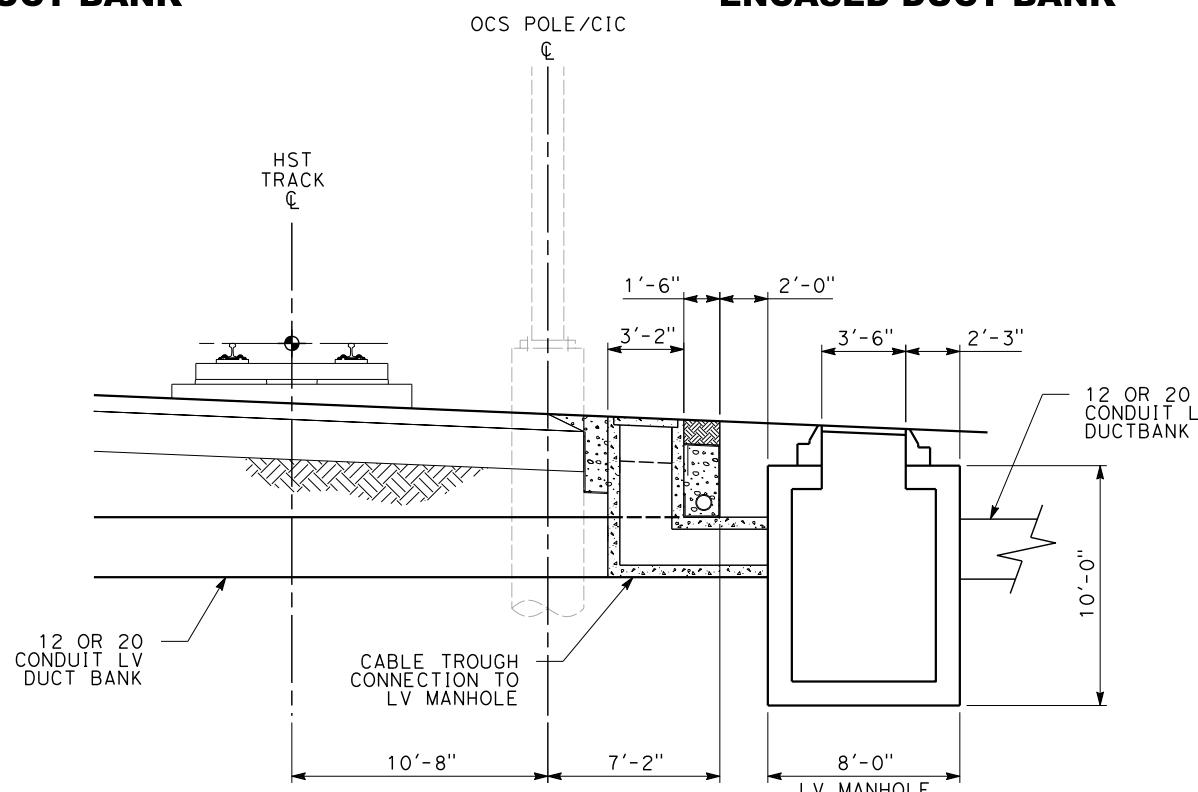
**20 CONDUIT CONCRETE
ENCASED DUCT BANK**



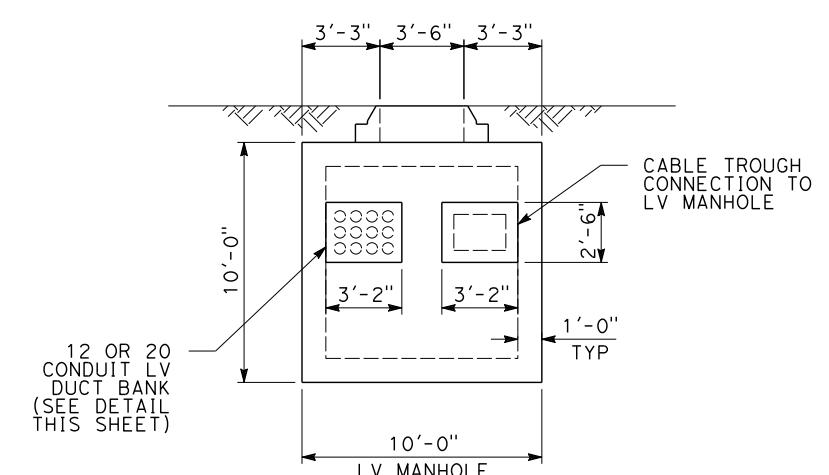
**12 CONDUIT CONCRETE
ENCASED DUCT BANK**



PLAN



SECTION



SECTION

REV	DATE	BY	CHK	APP	DESCRIPTION

**PARSONS
BRINCKERHOFF**



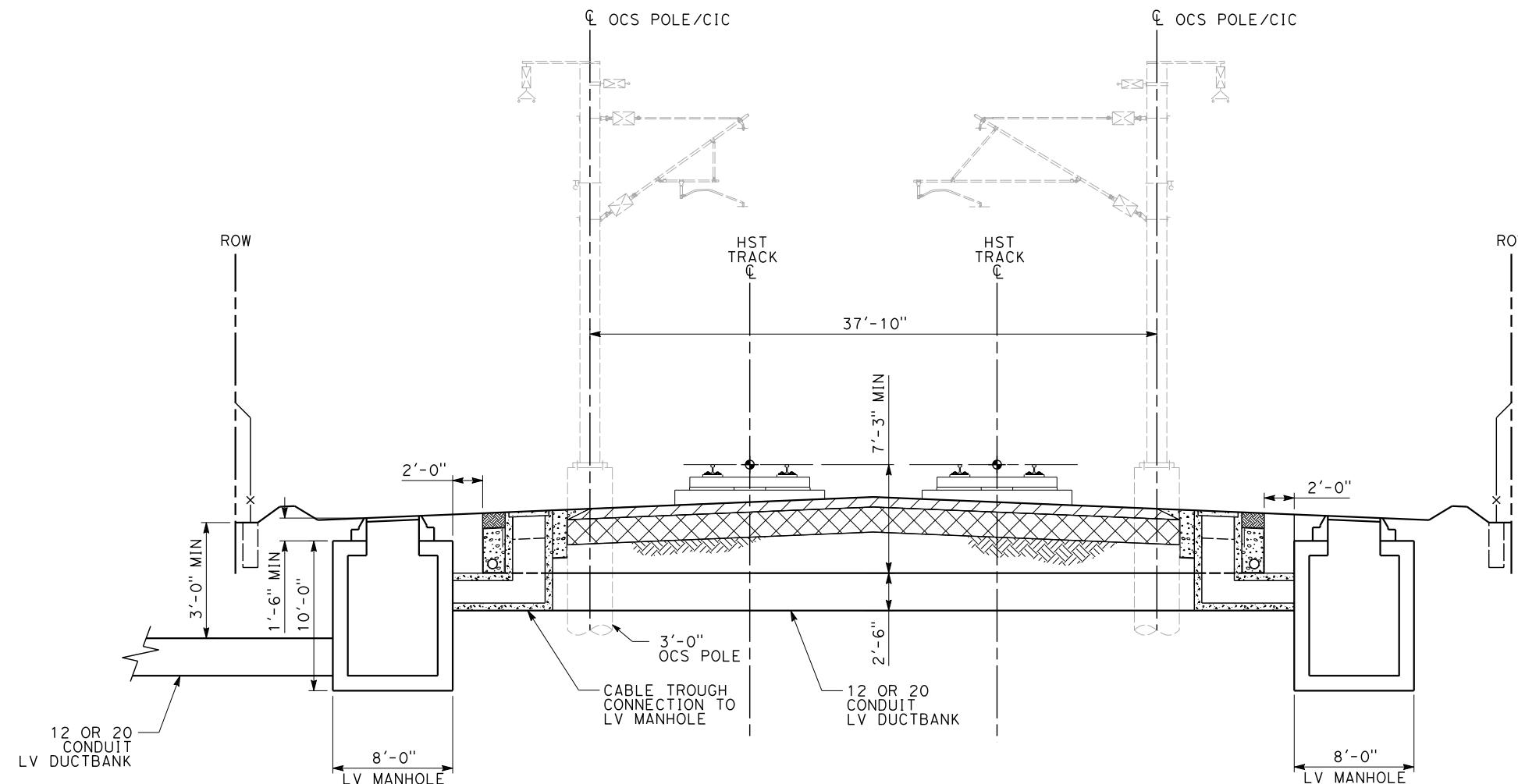
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

TYPICAL CROSS SECTION
LOW VOLTAGE MANHOLE / CABLE TROUGH / DUCTBANK
DETAILS

CONTRACT NO.	
DRAWING NO.	DD-CO-G023
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. MANHOLE SHALL NOT BE ALIGNED WITH OCS FOUNDATION OR FENCE FOOTING.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS	
DRAWN BY V. HUANTE	
CHECKED BY C. DALOIA	
IN CHARGE R. SCHMEDES	
DATE	

**PARSONS
BRINCKERHOFF**

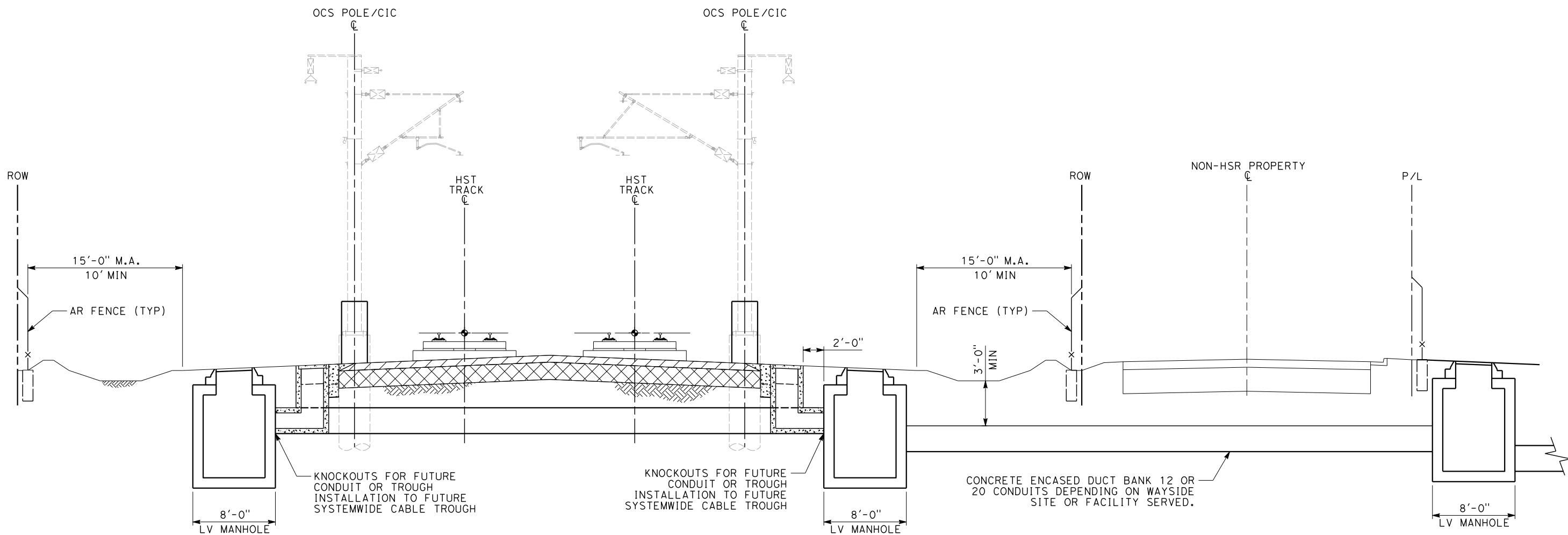


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDERTRACK CONDUIT DUCT BANK
AT-GRADE

CONTRACT NO.	
DRAWING NO.	DD-CO-G040
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.



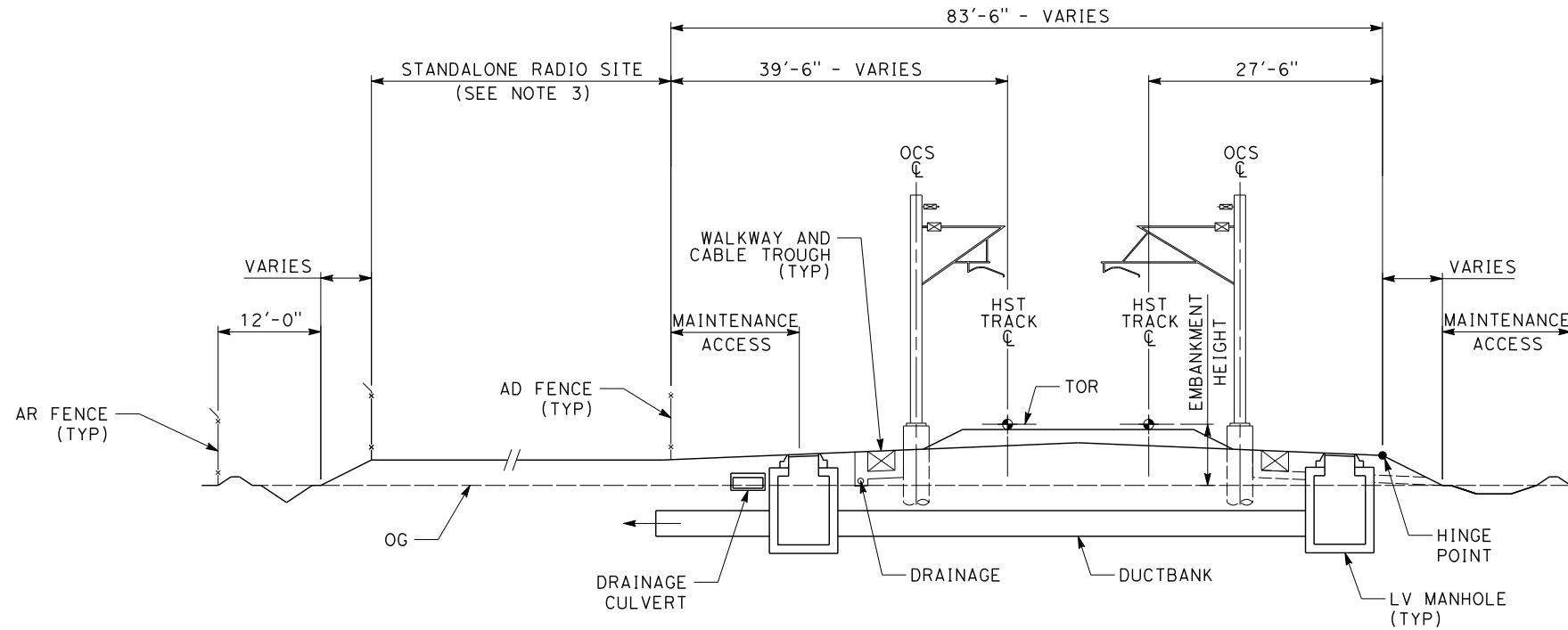
REV	DATE	BY	CHK	APP	DESCRIPTION	DESIGNED BY B. BANKS	DRAWN BY V. HUANTE	CHECKED BY C. DALOIA	IN CHARGE R. SCHMEDES	DATE 01/24/2014

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDER TRACK/UNDERGROUND CONDUIT DUCT BANK
AT-GRADE

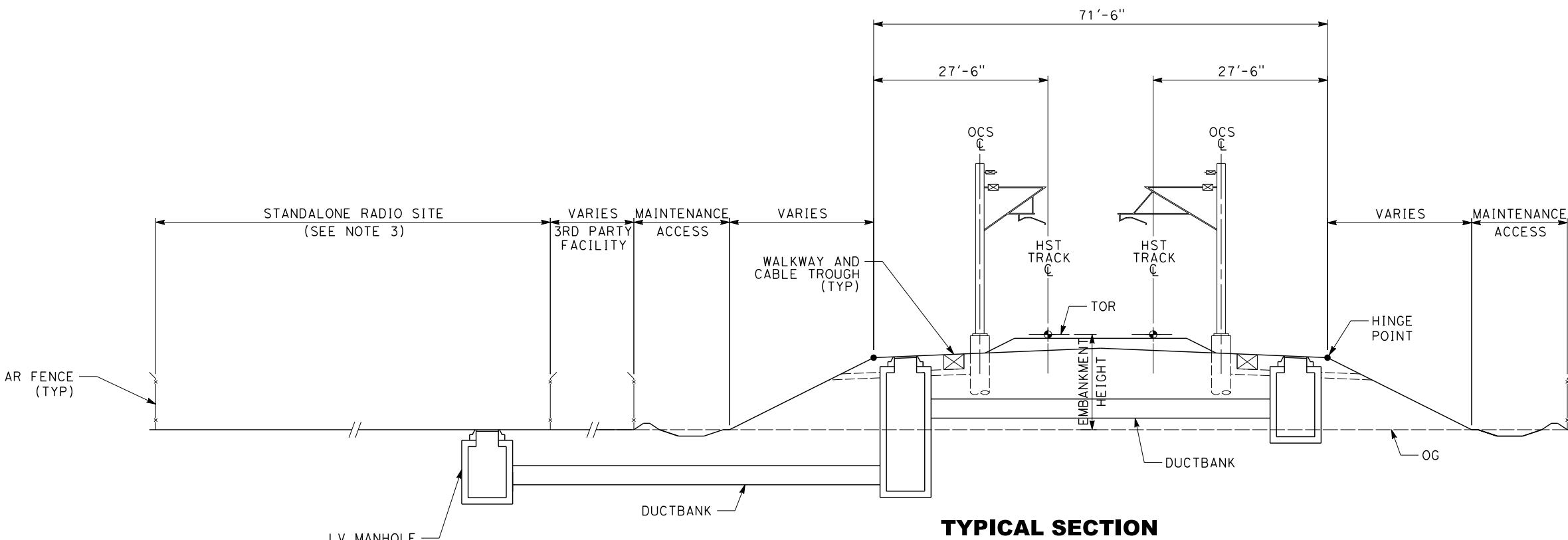
CONTRACT NO.
DRAWING NO. DD-CO-G041
SCALE NO SCALE
SHEET NO.



TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO AT-GRADE HST TRACKWAY
WITH EMBANKMENT HEIGHT (TOR-OG) \leq 10 FEET

NOTES:

1. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
5. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES TO BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
8. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM AT-GRADE HST TRACKWAY OR
EMBANKMENT HEIGHT (TOR-OG) $>$ 10 FEET

DESIGNED BY C. DALOIA	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALTY	IN CHARGE B. BANKS	DATE 8/29/2014	CONTRACT NO. DRAWING NO. DD-CO-G050 SCALE NO SCALE SHEET NO.
REV	DATE	BY	CHK	APP	DESCRIPTION

**PARSONS
BRINCKERHOFF**



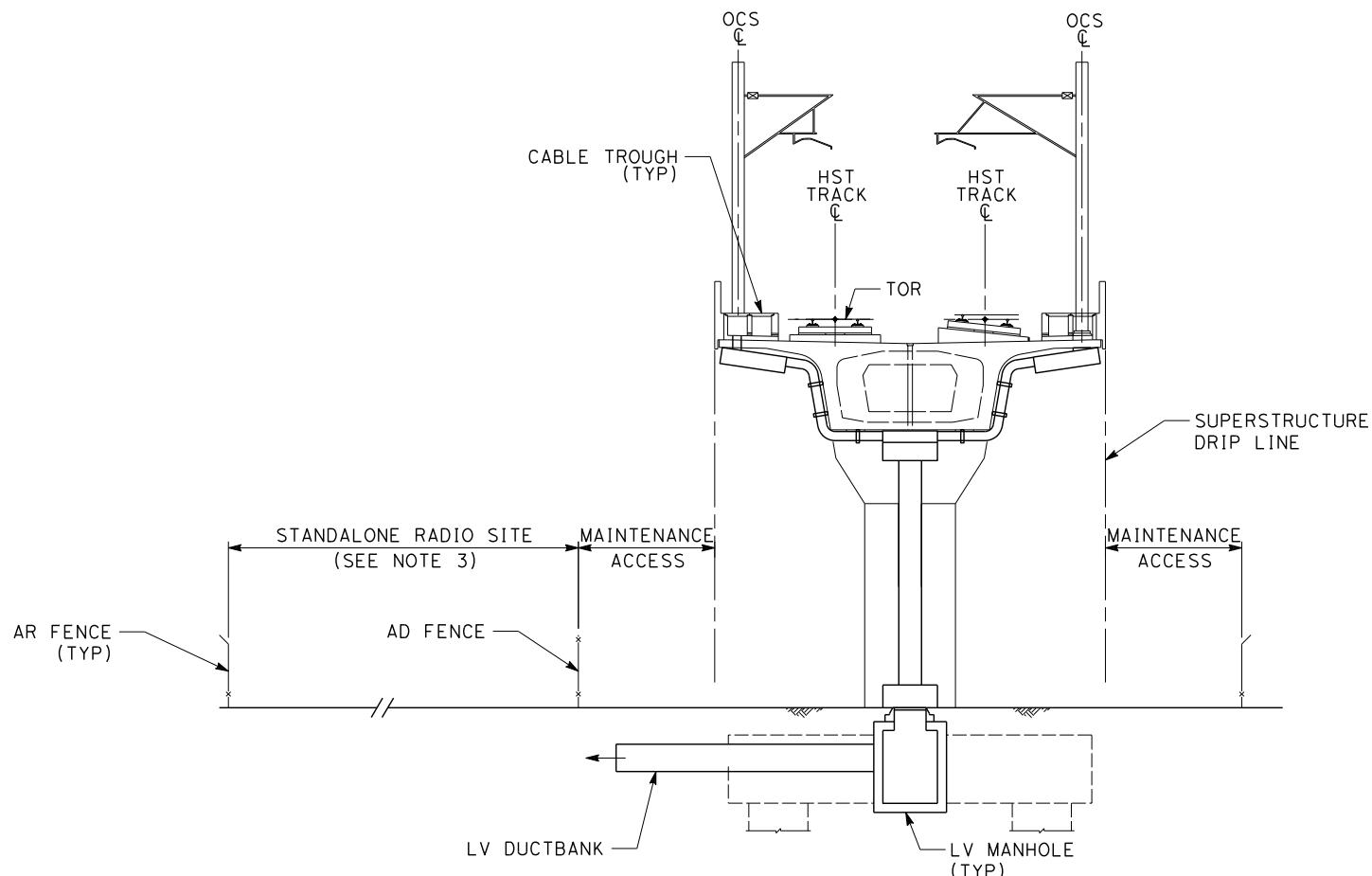
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

SYSTEMS SITE
STANDALONE RADIO SITE
AT-GRADE

NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
3. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
STANDALONE RADIO SITE AT AERIAL TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION

**PARSONS
BRINCKERHOFF**

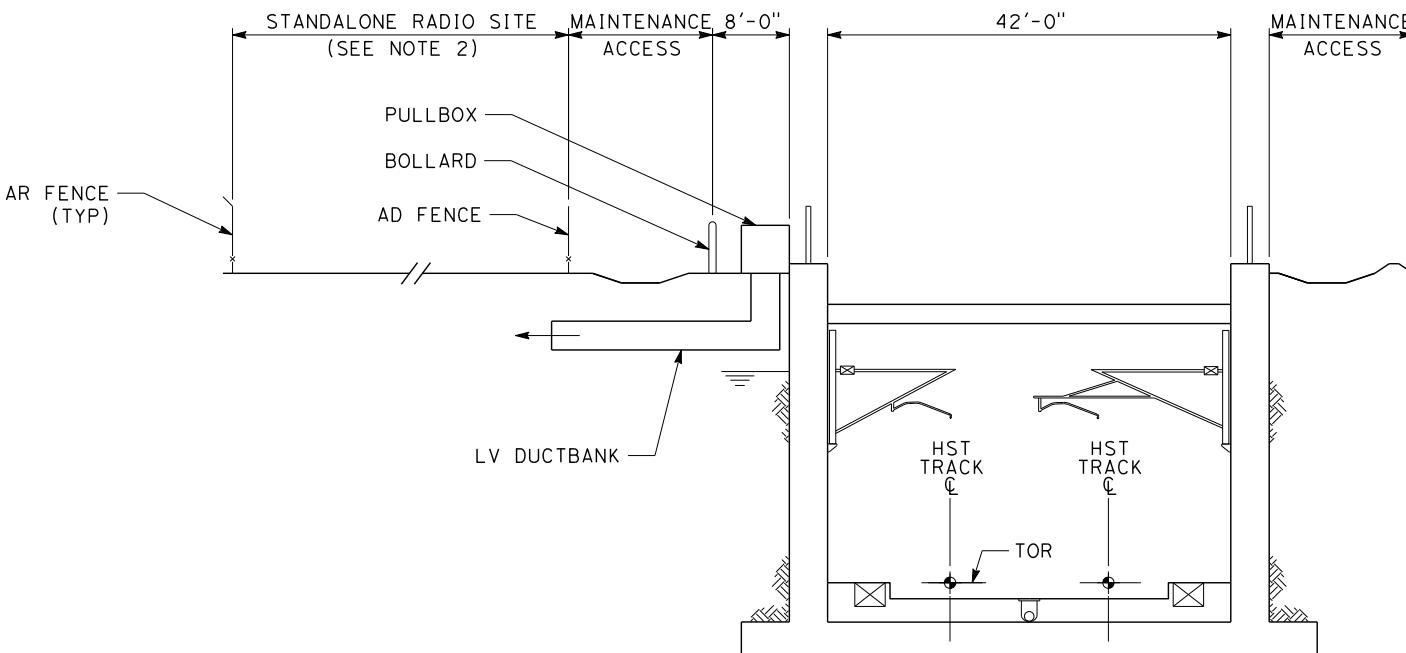


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
SYSTEMS SITE
STANDALONE RADIO SITE
AERIAL

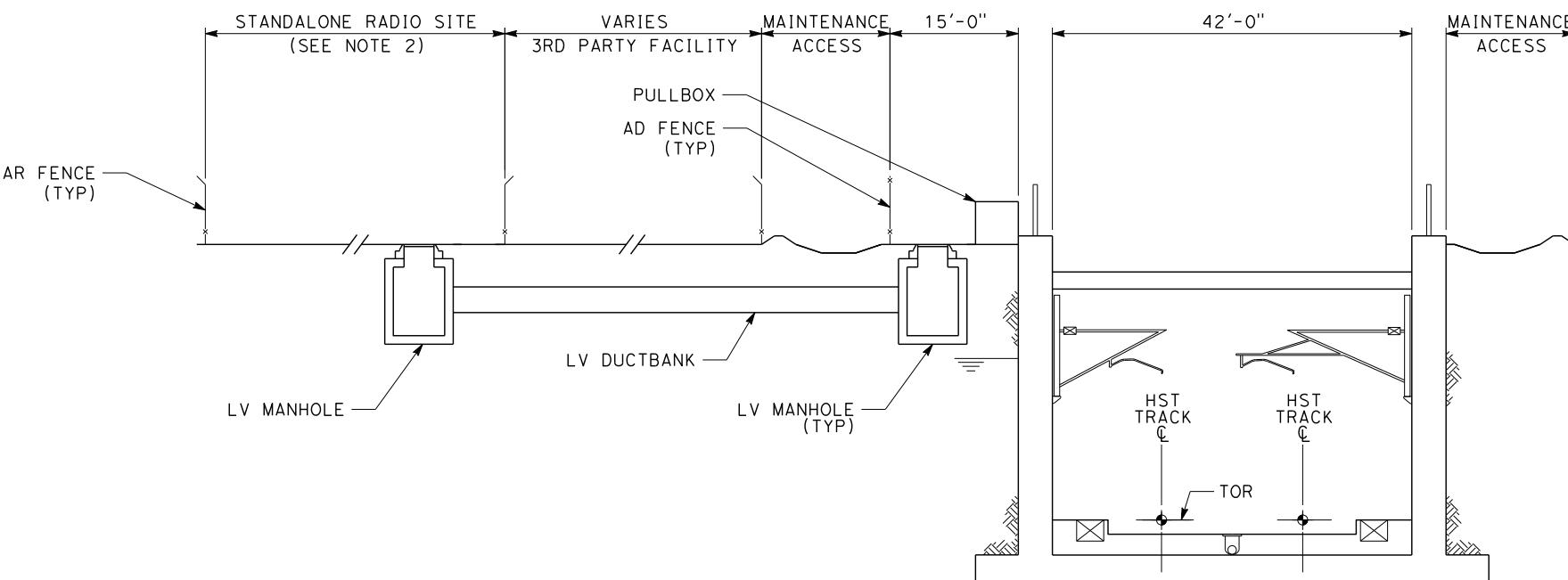
CONTRACT NO.	
DRAWING NO.	DD-CO-G051
SCALE	NO SCALE
SHEET NO.	

NOTES:

1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIRED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
3. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
4. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
8. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
9. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLES TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.

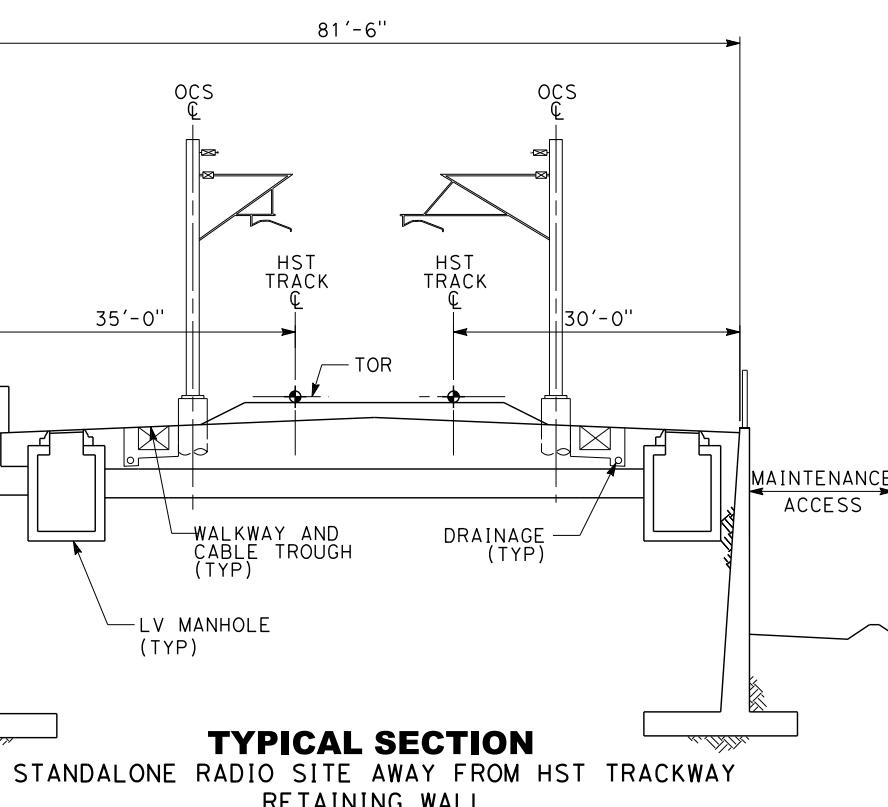
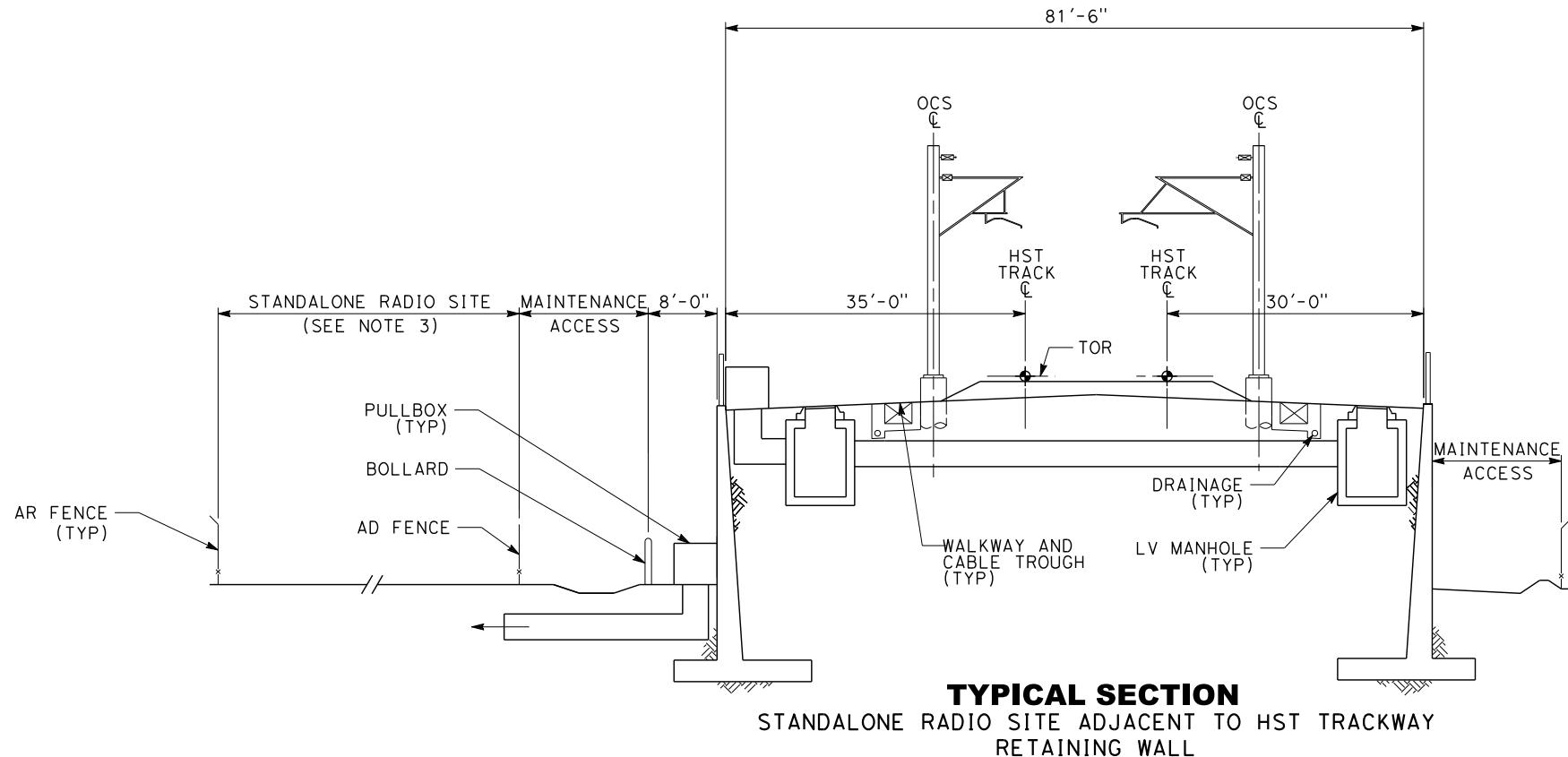


TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM TRENCH HST TRACKWAY

DESIGNED BY C. DALOIA	DRAWN BY V. LAVERDE	CHECKED BY B. MCNALLY	IN CHARGE B. BANKS	DATE 8/29/2014	PARSONS BRINCKERHOFF	 CALIFORNIA HIGH-SPEED RAIL AUTHORITY	CALIFORNIA HIGH-SPEED TRAIN PROJECT COMMUNICATIONS DIRECTIVE	CONTRACT NO. DRAWING NO. DD-CO-G052
REV	DATE	BY	CHK	APP	DESCRIPTION		SYSTEMS SITE STANDALONE RADIO SITE TRENCH	SCALE NO SCALE SHEET NO.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

**PARSONS
BRINCKERHOFF**



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
SYSTEMS SITE
STANDALONE RADIO SITE
RETAINED-FILL

CONTRACT NO.
DRAWING NO.
DD-CO-G053
SCALE
NO SCALE
SHEET NO.